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The gnathiids from the Brazilian southeastern continental shelf and slope: distribution, ecological notes and description of three new species

(Crustacea, Isopoda, Gnathiidae)

By **Ana Maria S. Pires**

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The gnathiids from the Brazilian southeastern continental shelf and slope are studied. The species were taken in water from 20 to 530 m depth. Four species were found: three new species are described *(Gnathia ubatuba, Gnathia ricardoi,* and *Gnathia andrei)* and *Bathygnathia magnifica* Moreira, 1977 is reported for the first time since its description. The three new species are in the "Productae" section of the genus (Monod 1926). Depth, distribution and ecological data are presented.

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Introduction

During a broad oceanographic investigation on the tropical south Atlantic shelf ecosystem conducted in the Ubatuba region, northeastern São Paulo State, Brazil, the benthic fauna was intensively sampled from December 1985 to December 1988. Fourteen cruises obtained samples from 20 to 530 m depths and four species of gnathiids were found, three of them new.

The gnathiids were studied first due to their great abundance especially below the 70 m isobath. Furthermore, the group is poorly known from the Brazilian waters. The only report is that of Moreira (1977) describing a new species of *Bathygnathia* from southwestern Atlantic deep waters.

The genus *Gnathia* was erected by Leach, 1813. Monod (1926) in his systematic revision of the Gnathiidae presented 53 species of *Gnathia* (s. str.) based on adult males, and described 21 of them. Camp (1988) listed the 38 species of the genus that had been known since Monod's revision. Later, Müller (1988, 1989a, b, 1991, 1993) added 9 new species to the genus and synonymized *G. puertoricensis* Menzies & Glynn with *Gnathia virginalis* Monod (Müller 1993). So, the genus currently has 99 species based on adult males. The three new species described herein belong to Monod's section "Productae" (Monod 1926) because they have the frontal margin of head broadly elevated at middle.

The benthic shelf break region (100 to 150 m deep) off São Paulo State is characterized by patches of calcareous algae (Melobesiacea, free living or concreted) surrounded by sand or muddy sand (Kempf 1972). The calcareous substratum is highly suitable for burrowing animals like polychaets, sipunculids and gnathiids, which inhabit the canals between the algal lamina. Gnathiids found in those spaces were living in groups, that is, one adult male was found together with both a number of praniza and adult females or only with praniza larvae and/or immature males.

Material and Methods

The material was collected during eight cruises of the research trawler "Veliger II" over the inner shelf (10 to 50 m depths) and six cruises of R/V "Prof. W. Besnard" over the outer continental shelf and continental slope (50 to 530 m) of Ubatuba region, São Paulo State, Brazil. the whole area is between latitudes 23°34' S to 24°49' S and longitudes 44°13' W to 45°09' W (Tab. 1).

The animals were sampled with a rectangular dredge, a beam trawl, and a 0,1 m^2 van Veen grab. In the laboratory the sediment was sorted under a binocular stereomicroscope, and the hard substrate (calcareous algae and corals) was broken up to obtain the burrowers and discarded. When the animals were picked up from each fragment, they were counted and their stage of development determined. The specimens were preserved in alcohol 70 %.

The type material is deposited in the following institutions: Museu de Zoologia, Universidade de São Paulo (MZSP), Museu Nacional deo Rio de Janeiro (MNRJ) and Instituto Oceanográfico da Universidade de São Paulo (IOUSP).

Bathygnathia magnifica Moreira, 1977

Bathygnathia magnifica Moreira, 1977: 12, Figs 1-17 (holotype male, Brazil: off State of Santa Catarina, 387 m depth, 170, P.S. Moreira coll. MZSP, examined); Camp 1988: 674.

Only one adult male of *B. magnifica* was collected at 240 m. The occurrence is the shallowest and most northeastern record of the species.

Gnathia ubatuba, spec. nov.
Figs 1-18

Types. Holotype: ♂, Brazil. São Paulo State, Ubatuba continental shelf, Sta. 4856, 24°13'S, 44°45'W, 110 m depth, 17.12.1985, R/V "Prof. W. Besnard" coll. (MZSP, cat. No. 11510). – Paratypes: 20♂♂, 2♀♀, 12 praniza, idem (18 MZSP 11511, 16 paratypes 3230); 36♂♂, 12♀♀, 24 praniza, Sta. 4948, 24°01'S, 44°33'W, 105 m depth, 26.07.1986, R/V "Prof. W. Besnard" coll. (36 MZSP 11512, 36 MNRJ 3231).

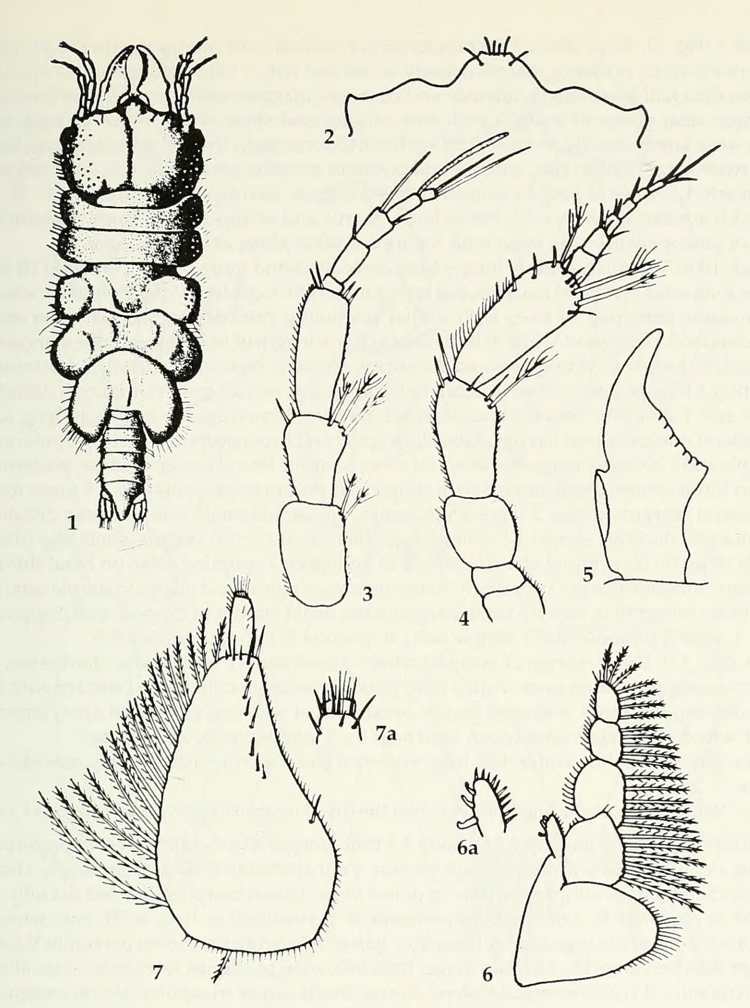
Additional material. Besides the selected types, 358 specimens in different growth stages were examined from the area of study and deposited at IOUSP.

Description

Holotype adult male 3.8 mm long (Fig. 1). Body nearly 2.8 times longer than wide, light brown or white colored; integument indurate, with simple setae all around; small tubercles laterally placed on head and pereonites II-IV. Head about 1.5 times wider than long, frontal margin with central protrusion bearing 6 apical setae (Fig. 2), anterior and median dorsal surface excavated, dark brown eyes laterally protruded. Pereonite I nearly half pereonite II lenght, laterally fused to head. Pereonites II-III almost subequal in length, excavate anteriorly. Perionite IV as long a second and third pereonites together, deeply excavate middorsally. Pereonite V directed backwards with dorsal round lobes. Pereonite VI strongly bent backwards, distal margin extending beyond pleonite 2, twice length of anterior pereonite and 7 times longer than pereonite VII. Pereonite VII shorter than pleonite 1 with lateral margins embedded into pereonite VI. Pleon with 5 pleonites subequal both in length and width, coxal plates not visible from dorsal view; pleotelson broadly triangular apex straight nearly twice uropodal endopod lenght; uropod endopods slightly surpassing and exopods not reaching apex of pleotelson.

Antenna 1 (Fig. 3). Peduncle articles 1 and 2 almost subequal in length with 2-3 broom setae inner distally placed; article 3 longest, ⅓ longer than article 2. Flagellum of 5 articles, first article shortest, ring-like, as wide as following 2 articles; article 4 narrow, bearing elongate aesthetasc.

Antenna 2 (Fig. 4). Peduncle of 5 articles, first two narrower than following articles; article 2 shortest, ⅕ length of article 5; article 3 half length of last peduncular article; article 4 bearing short seatae along margin and long feather bristle and 3 simple setae distally placed; article 5 slightly longer than



Figs 1-7. *Gnathia ubatuba*, spec. nov. 1-2. Holotype, adult male, 3.8 mm long. 3-7. Paratype, adult male, 3.7 mm long. 1. Body, dorsal view. 2. Frontal margin of head. 3. Antenna 1. 4. Antenna 2. 5. Mandible. 6. Maxilliped. 6a. Lateral lobe with 3 coupling-hooks. 7. Pylopod. 7a. Tip of pylopod.

flagellum, with many short setae along outer margin and 8 simple setae and 3 feather-like bristles. Flagellum of 6 articles narrowing distally, last article with 1 long and 2 short apical simple setae.

Mandible (Fig. 5) large, stout, nearly ⅙ body length; frontal lamina with minute denticles, apex blunt elongate curved inwards; lateral outer margin bent ventrally.

Maxilliped (Fig. 6). Basis as long as palp articles 1 to 3 together, outer margin strongly curved, setose, inner margin straight with distal lobe bearing 3 coupling-hooks and many short setae. Four distal articles bearing finely fringed setae shortening distalwards.

Pylopod (Fig. 7) of 3 articles; article 1 pear-shaped nearly 4.5 times longer than following articles together, outer distal surface with longitudinal row of simple setae, long plumose setae along inner margin, basal and outer margins fringed by fine setae; article 2 about 10 times longer and slightly wider than apical article, surface of upper half bearing simple setae; article 3 twice wider than long with fine setae placed along apex.

Pereopod I (Fig. 8). Basis about 1.3 times length of ischium and merus together, 4 plumose setae along anterior margin, posterior margin densely setose and with 1 longer plumose seta apicall placed; ischium less than half basis length, anterior and posterior margins with distal quarter bearing 1 stout long plumose seta; posterior margin with row of long and short setae; merus as long as carpus, 2 plumose setae anterodistally, both articles with posterior margin fringed with long and short setae; propodus twice lenght of dactylus, anterior and posterior margins setose, a broom setae anterodistally; dactylus nearly 1.5 times as long as elongate curved unguis, having apical simple seta.

Pereopod II similar to pereopod I, but ischium, merus and carpus having spiny posterior margins like those of pereopods III to V; basis with 8 plumose setae along anterior margin.

Pereopods III to V similar, slightly longer than precedents and more setose; pereopod III basis with 11 plumose long setae on lateral margins, 6 at anterior margin, ischium having 6 plumose setae at basal posterior margin; pereopod IV basis with similar setation as precedent pereopod, other articles like those of pereopod V. Pereopod V (fig. 9) basis almost twice length of ischium, anterior margin crenulate at basal third, 2 short and wide spines and 2 elongate plumose setae along distal $^2/_3$, posterior margin setose bearing 4 long plumose setae; ischium twice as long as merus, posterior margin desnely setose, 2 plumose and 1 elongate simple setae at distal anterior corner; merus nearly as long as carpus, posterior lateral margin setose having short blunt spine and broom seta at distal end, anterior margin with 3 simple and 1 plumose long setae at apical corner; carpus lateral margins setose, posterior margin with 2 short blunt spines, distal surface with simple and broom setae; propodus 2.4 times longer than dactylus, lateral margins setose, 2 large acute spines, one at midlength and one near distal corner of posterior margin; dactylus almost 1.5 times longer than stout curved unguis, short seta distally.

Pleopods (Figs 10-12) sympod about $^1/_3$ length of endopod, 2 coupling setae on basal third of inner lateral margin, anterior margin irregularly setose bearing single apical elongate simple seta; endopod nearly 1.2 times longer than expod, distal margins bare; distal margin of exopod with 2 opposing setae in exopod 1, with 3 plumose and 1 simple setae in exopod 2, bare in exopods 3-5.

Uropods (Fig. 13). Outer margin of sympod setose, dorsal surface with sparse short setae; endopod slightly surpassing pleotelson apex, with 3 long plumose setae distally, dorsal surface with few setae mediodistally; exopod about $^1/_7$ shorter than exopod, almost reaching pleotelson apex, lateral margin basal third setose, 3 plumose setae along remanent $^2/_3$, 3 long plumose apical setae.

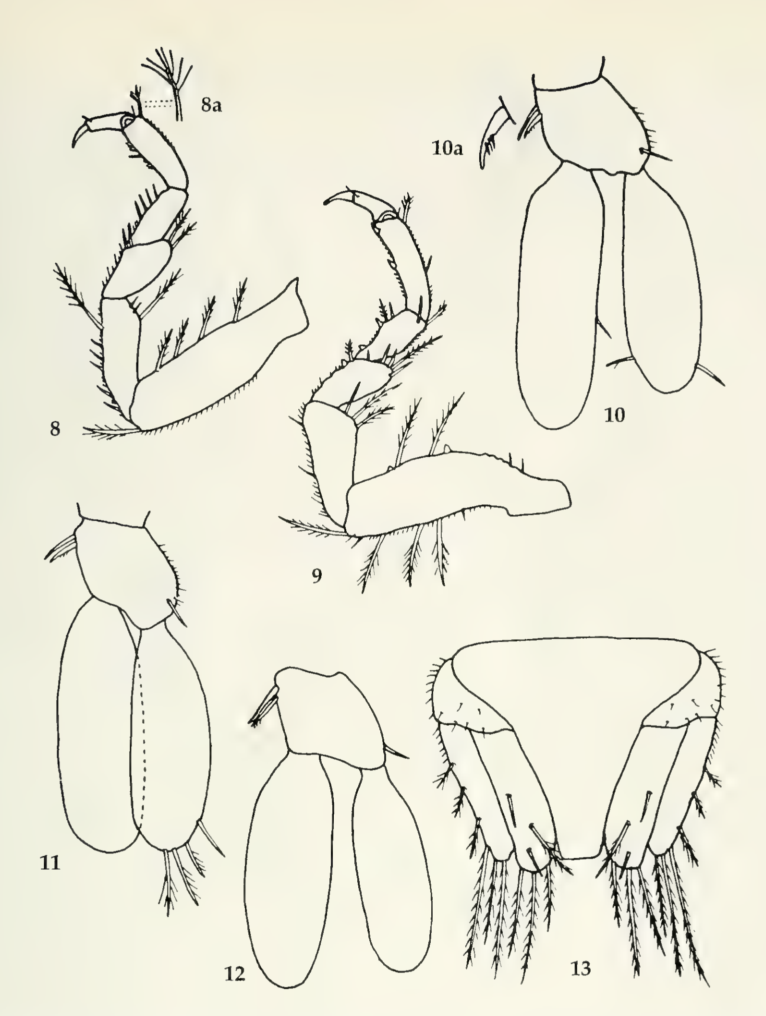
Pleotelson (Fig. 13) slightly wider than long, widest at base tapering distally; apex as wide as $^1/_8$ basal width, bare.

Remarks. Some males, including holotype, had the distal margin of pleopodal exopods 1 and 2 bare.

Ovigerous female, 3.5 m long (Fig. 14). Body 2.3 times longer than wide, widest at posterior margin of pereonite IV, yellowish with translucent pereon. Cephalothorax thrice pleon length. Head nearly thrice wider than long, mouthparts visible in dorsal view; lateral margins directed dorsally; peronite I embedded in pereonite II, half length of pereonite II; pereonite II as long as III, both having lateral margins directed upwards together with anterior half of following pereonite; pereonite V longest, 1.2 times longer than pereonite IV, 1.5 times longer than following pereonite, few sparse setae along lateral margins; pereonite VI with incomplete lateral suture, distal corner triangular, lateral margins bearing some setae; pereonite VII very short, about 30 times shorter than pereonite V. Pleonites slightly increasing in length posteriorly, coxal plates visible dorsally on pleopods 4-5; pleotelson as long as wide, uropods slightly projecting beyond pleotelson apex. Pylopod (Fig. 15) of 4 articles; article 1 globose, 1.4 times longer than wide, with large strong basal seta, lateral distal margin irregularly setose; article 2 1.6 times wider than long, lateral and distal margins setose; article 3 almost half as wide than preceding article, 1.5 times longer than wide, lateral margins bearing many setae; apical article short, globose, about $^1/_9$ length of article 3, margins setose. Pereopods all similar to pereopod I with fewer setae. Pereopod I (Fig. 16) basis longer than following 2 articles, anterior margin with single short broom seta; ischium 1.3 times longer than merus, anterior margin bearing basal simple seta and distal elongate broom seta, posterior margin sparsely setose; merus having 2 long simple setae at distal anterior corner, 2 elongate and some short setae on posterior margin; carpus about 0.7 times length of propodus, posterior margin setose bearing single elongate seta; propodus 2.4 times longer than dactylus, 1 broom seta distally placed at anterior margin; unguis curved, slightly shorter than in males.

Remarks. All females studied were gravid bearing 26-30 eggs in the marsupium.

Last stage praniza, 3.9 mm long. Pylopod (Fig. 17) very few setose with distal serrate spine; propodus half length of all 3 precedent articles; dactylus large prehensile, nearly 3 times length of unguis.



Figs 8-13. *Gnathia ubatuba*, spec. nov. 8-11, 13. Paratype, adult male, 3.7 mm long. 12. Holotype, adult male, 3.8 mm long. 8. Pereopod I. 8a. Apical setae of propodus. 9. Pereopod V. 10. Pleopod 1. 10a. Coupling setae of sympod. 11. Pleopod 2. 12. Pleopod 5. 13. Pleotelson with uropods.

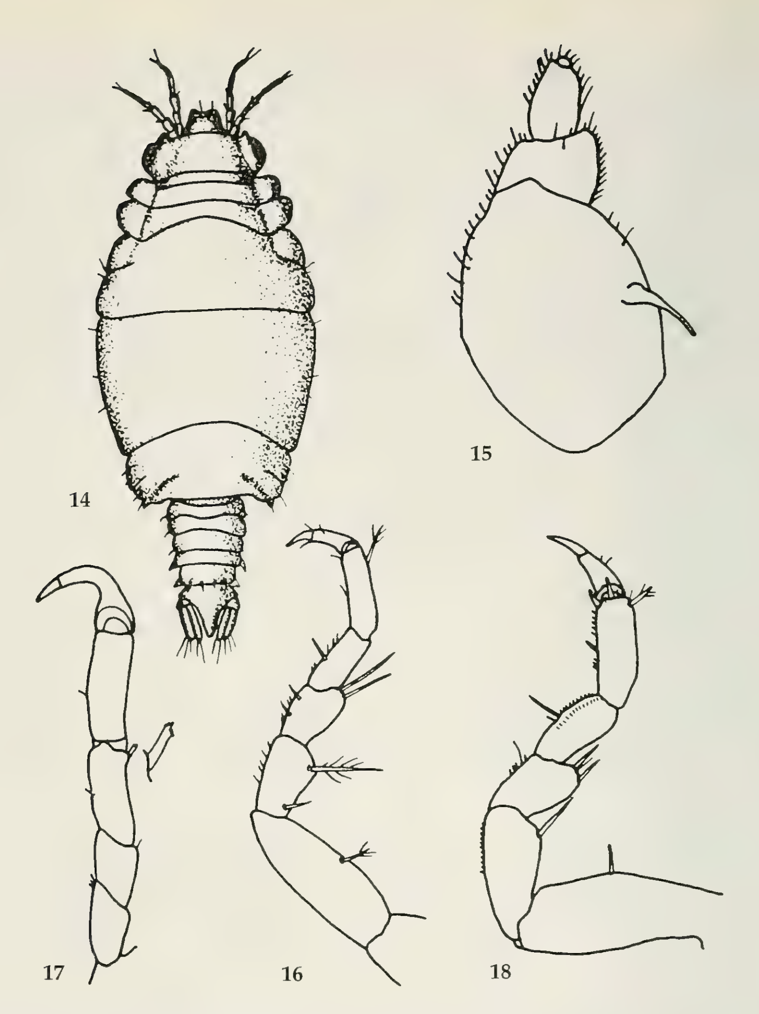
Pereopod I (Fig. 18) similar to that of female except by 2 rows of short setae laterally on carpus, 2 strong spines placed at distal margin of propodus, and longer acute unguis slightly shorter than dactylus.

Distribution. Southeastern Brazil: São Paulo State, Ubatuba continental shelf and upper slope.

Etymology. Ubatuba is the type locality of the new species.

Habitat. The species was found in hard, sandy bottoms on the continental shelf, between 20 and 320 m depth and in a thermal range of 13 to 25 °C. It was especially abundant in crevices of the calcareous hard bottoms from the outer shelf and shelf break region, between 100 and 130 m depth.

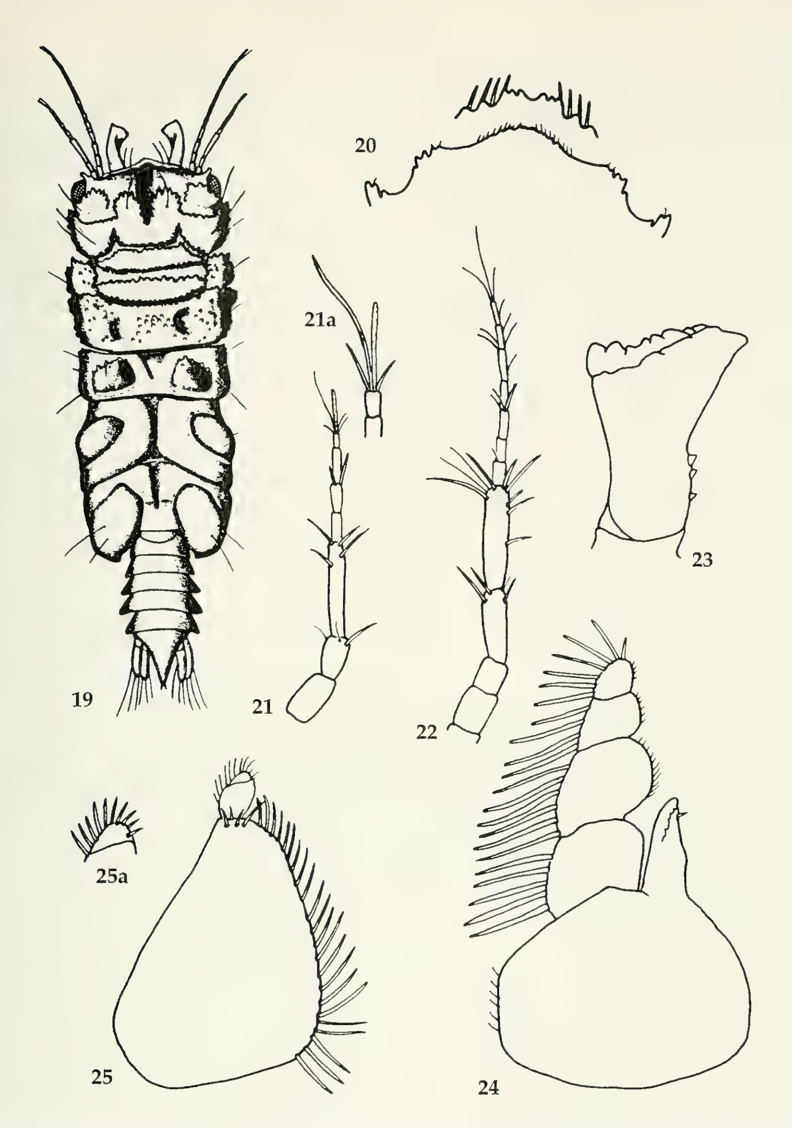
Taxonomic discussion. *Gnathia ubatuba* resembles *G. polaris* Hodgson from Antarctic waters (see Brandt & Wägele 1991, for nomenclatural status of *Gnathia polaris*). However, *Gnathia ubatuba* differs mainly by having body less setose, pereonites V-VI larger and bent backwards, pereonite VII plus pleonites 1-2 englobed by pereonite VI, mandible incisive process with an elongate apex curved



Figs 14-18. *Gnathia ubatuba*, spec. nov. 14-16. Adult female, 3.5 mm long. 17-18. Praniza, 3.9 mm long. 14. Dorsal view. 15. Pylopod. 16. Pereopod I. 17. Pylopod. 18. Pereopod I.

inwards, maxilliped with 3 coupling hooks. Other important differences are in shape and relative proportions between pleopods rami and on several aspects of the morphology of the pereopods, uropods and pleotelson. Females of both species are different in general body outline. *Gnathia ubatuba* has head and pereonites II-IV bent upwards and a remarkable lateral depression along these segments, which is absent in *G. polaris*. The latter has a smooth body, gently curved ventrally.

Biology. Adults predominated below 100 m depth, and pranizas were more numerous in shallower water. Males always were more abundant than females, varying in number from 2 to 10 times more at the different sites. The gnathiids were found in groups, inhabiting the spaces within the calcareous lamina of *Melobesia* (algae Corallinaceae) or into exoskeletons of dead corals *(Caryophyllia ambrosia)*. Generally several pranizas and/or a few immature males and/or few mature females were associated with a mature male. Group behavior of gnathiids was noted earlier by Amanieu (1969) and other workers in gnathiids from the European coasts.



Figs 19-25. *Gnathia andrei*, spec. nov. 19-20. Holotype, adult male, 2.5 mm long. 21-25. Paratype adult male, 2.4 mm long. 19. Dorsal view. 20. Frontal margin of head. 21. Antenna 1. 21a. Tip of antenna 1. 22. Antenna 2. 23. Mandible. 24. Maxilliped. 25. Pylopod. 25a. Tip of pylopod.

Gnathia andrei, spec. nov.

Figs 19-33

Types. Holotype: ♂, Brazil. São Paulo State, Ubatuba continental slope, Sta. 5120, 24°19'6"S, 44°40'6"W, 134 m depth, 10.07.1987, R/V "Prof. W. Besnard" coll. (MZSP, cat. No. 11517). – Paratypes: 8♂♂, idem (5 MZSP 11518, 3 MNRJ 3234); 5♂♂, 4♀♀, Sta. 5148, 24°14'S, 44°32'W, 134 m depth, 12.07.1987, R/V "Prof. W. Besnard" coll. (MZSP 11519); 3♂♂, 7♀♀, Sta. 5170, 24°09'S, 44°22'5"W, 136 m depth, 13.07.1987, R/V "Prof. W. Besnard" coll. (MNRJ 3235); 1♂, Sta. 5192, 24°23'2"S, 44°24'8"W), 180 m depth, 20.07.1987. R/V "Prof. Besnard" coll. (MZSP 11520).

Description

Holotype adult male 2.5 mm long (Fig. 19). Body nearly 3.0 times longer than wide, with few widely spaced simple long setae; head and first three pereonites white, indurate, other somites light brown, soft. Head about 1.8 times wider than long, frontal margin slightly protruded, dentate, with a row of short setae (Fig. 20), lateral margins dentate; dorsal surface with 2 dentate latero-dorsal plates behind eyes, large dorsal plate bifurcating at middle, each branch almost apex of ocular plate; eyes not protruded, lateral. Pereonite I nearly 0.3 times shorter than pereonite II, laterally fused to head, covered by a calcareous dentate plate. Pereonites II-III subequal in length, pereonite II with lateral lobes pitted, a calcareous dentate plate centrally placed. Pereonite III densely pitted. Pereonite IV slightly longer than pereonite I, lateral margins anteriorly excavate, 2 large lobes laterally placed. Pereonite V largest, with lateral broadly elongate lobes. Pereonite VI posterolateral margin reaching middle of pleonite 2, apex acute bent inwards, 2.3 times length of pereonite I and amost 8 times pereonite VII length. Pereonite VII shorter than pleonite 1. Pleon with 5 pleonites slightly increasing in length posteriorly, acute xocal plates visilbe in dorsal view; pleotelson triangular apex acute, with 2 terminal short setae; uropodal endopods shorter than pleotelson apex.

Antenna 1 (Fig. 21). Peduncle articles 1-2 almost subequal in length; article 3 as long as article 2 and 3 together. Flagellum 4 articulate, slightly longer than last peduncular article, apex bearing 1 aesthetasc.

Antenna 2 (Fig. 22). Three basal peduncle articles short; article 5 about 1.5 times length of article 4, with many elongate setae along lateral and distal margins. Flagellum of 7 articles, nearly 1.8 times longer than last peduncular article; distal articles longer than proximal articles.

Mandible (Fig. 23) short, about $^1/_{11}$ the body length; frontal lamina with broad denticles, inner corner protruded inwards; lateral inner margin with 3 acute spines.

Maxilliped (Fig. 24). Basis longer than palp articles 1-4 combined, inner margin with large elongate lobe bearing 1 coupling hook; palp articles with many elongate simple setae along outer margins, few short setae on inner margins.

Pylopod (Fig. 25) basal article about 5.6 times longer than following articles together, outer and distal margins having a row of long simple setae; article 2 elongate, about 4 times longer than apical article, lateral inner margins of both fringed with simple setae.

Pereopod I (Fig. 26). Basis slightly longer than ischium and merus together, anterior margin having row of elongate fine simple setae and 1 conical spine placed at distal third; ischium about $^3/_4$ length of basis, fewe elongate setae along posterior margin, 3 prominent long setae anterodistally; merus almost as long as carpus, 4 conical spines and some long setae placed along posterior margin; carpus with 1 basal conical spine and long hairy setae on posterior margin; propodus thrice length of dactylus, posterior margin with short and long spines, anterior margin with short hard setae needle-like; unguis near half length of dactylus, apex blunt.

Pereopod II-III similar, slightly shorter than precedents. Pereopod II (Fig. 27) basis having 3 acute projections and some elongate simple setae on anterior margin; ischium almost twice length of precedent article, merus and carpus subequal in length, each with 1-2 conical spines on posterior margin; propodus nearly 2.5 times dactylus length, 2 elongate acute spines on posterior margin; dactylus twice as long as wide, unguis having 3 short apical setae.

Pereopods IV-V similar (Fig. 28), slightly longer than precedents without spines on basis, merus and carpus; propodus with 4 groups of 1 elongate acute spine plus 1-2 elongate setae along posterior margin; dactylus about 1.5 times longer than elongate narrow unguis, 3 short setae distally.

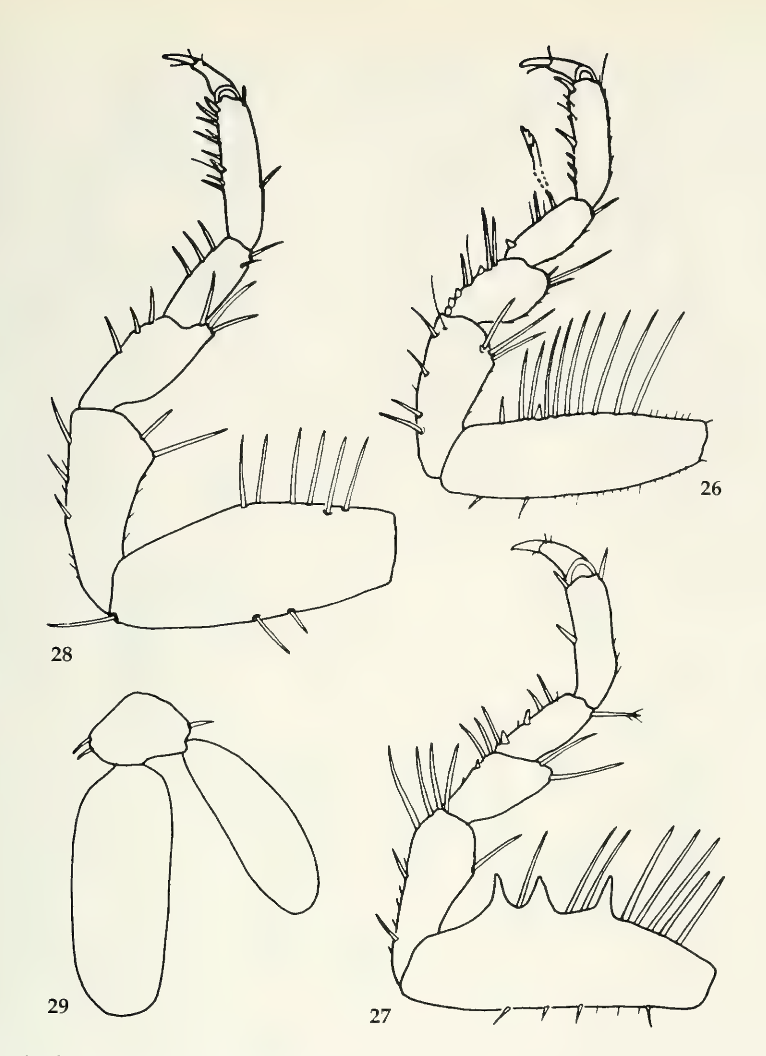
Pleopods 1-5 similar (Fig. 29), sympod nearly 4 times shorter than endopod, 2 coupling setae centrally placed at inner lateral margin, outer margin with elongate simple seta; edopod nearly 1.3 times longer than exopod, both articles bare.

Uropods (Fig. 30). Sympod bare; endopod reaching pleotelson apex, subequal in length to exopod, many plumose setae sub-apically and apically placed on both articles.

Pleotelson (Fig. 30): 1.3 times longer than wide, tapering posteriorly to broad rounded apex having 2 short setae.

Remarks. Adult males varied from 2.3 to 2.5 mm length.

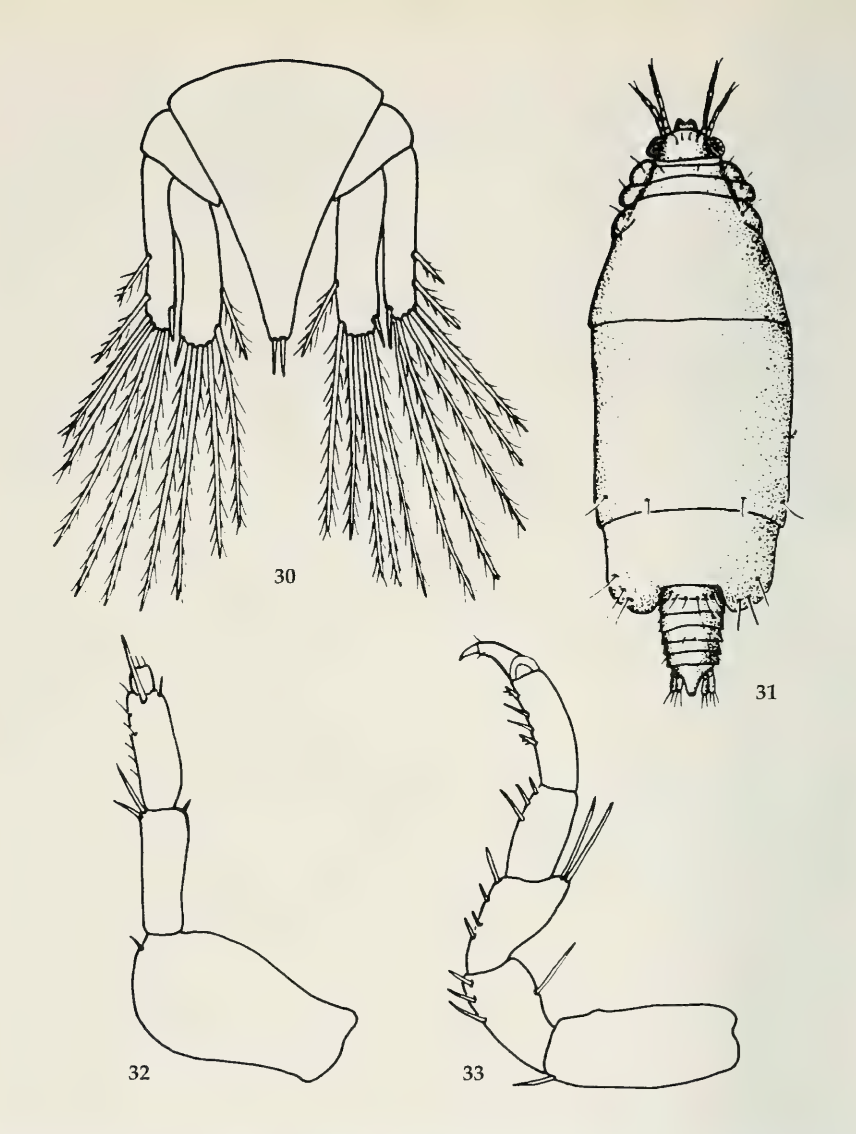
Ovigerous female, 2.5 mm long (Fig. 31). Body elongate about 2.8 times longer than wide, widest at pereonites IV and V junction, white, few setae placed along posterior margins of pereonites. Head about 2.4 times wider than long, mouthparts visible in dorsal view; cephalothorax nearly 5 times as long as pleon. Peronite I embedded in pereonite II, $^1/_3$ length of pereonite II; pereonite II as long as III, both



Figs 26-29. *Gnathia andrei*, spec. nov., paratype adult male, 2.4 mm long. 26. Pereopod I. 26a. Dentate setae from carpus. 27. Pereopod II. 28. Pereopod V. 29. Pleopod 1.

having lateral margins directed slightly upwards; pereonite V longest, 1.5 times longer than pereonite IV, 2.5 times longer than following pereonite; pereonite VI posterolateral margin reaching pleopod 1 posterior margins; pereonite VII short, about 12 times shorter than pereonite V. Pleonites subequal in length, coxal plates not visible dorsally; pleotelson as long as wide, uropods reaching pleotelson apex. Pylopod elongate (Fig. 32). first article 1.7 times longer than wide, lateral margin bare; articles 2-3 elongate, subequal in length 1 long seta anhd few short setae distally; apical article almost 4.4 times shorter than precedent article, distal margin with 2 short setae. Pereopods all similar to pereopod I. Pereopod I (Fig. 33) basis as long as merus and carpus together, anterior margin bare; ischium, merus and carpus nearly subequal in length, posterior margin with scattered elongate setae; propodus twice longer than dactylus, 2 elongate setae and 2 spines on posterior margin; unguis ⅓ length of dactylus.

Remarks. Fourteen adult females were obtained in a total of 35 specimens.



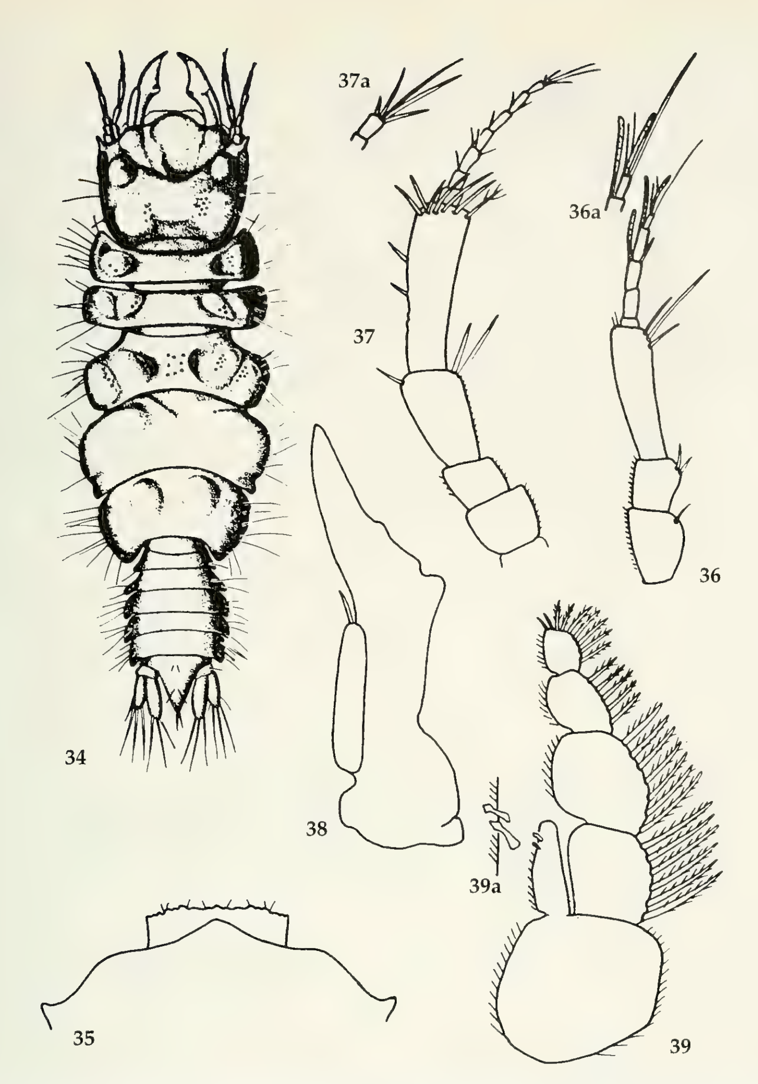
Figs 30-33. *Gnathia andrei*, spec. nov. 30. Paratype adult male, 2.4 mm long. 31-33. Paratype adult female, 2.5 mm long. 30. Pleotelson with uropods. 31. Dorsal view. 32. Pylopod. 33. Pereopod I.

Distribution. Southestern Brazil: São Paulo State, shelf break region offshore of Ubatuba.

Etymology. The species is named after my younger son, André.

Habitat. *Gnathia andrei* occurred only in the shelf break zone, between 134 and 180 m depth, in dead corals.

Taxonomic remarks. *Gnathia andrei* is unique because it has conspicuous calcareous dentate plates on head and pereonites I to III.

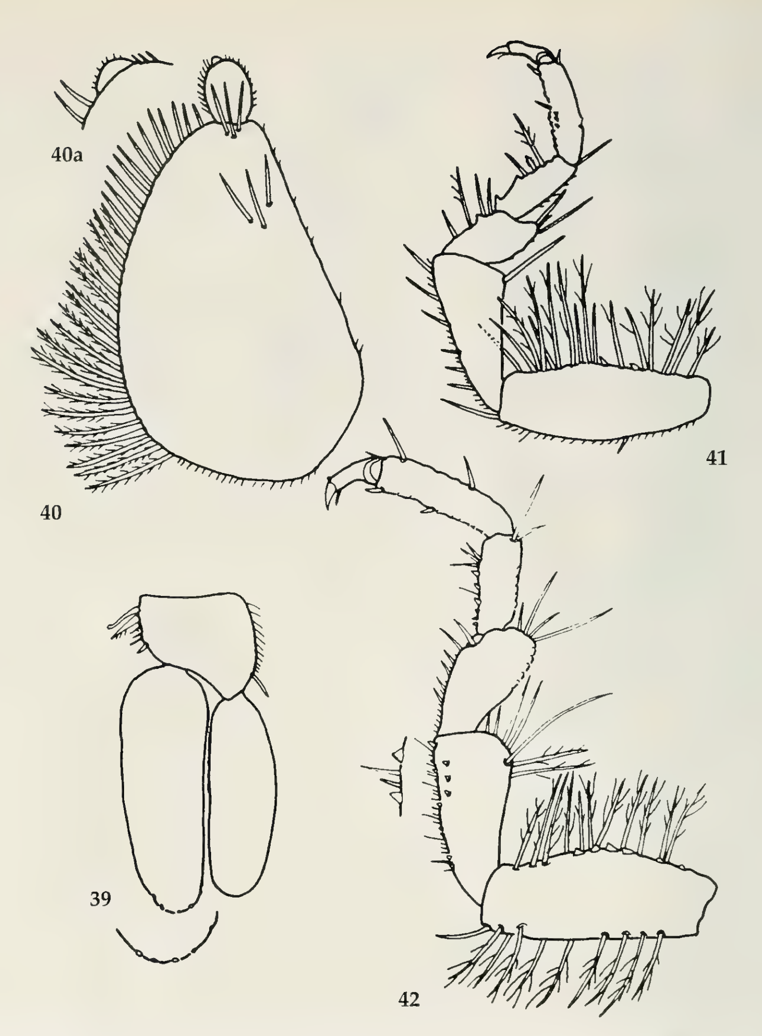


Figs 34-39. *Gnathia ricardoi*, spec. nov. 34-35. Holotype adult male, 5.5 mm long. 36-39. Paratype adult male, 5.6 mm long. 34. Dorsal view. 35. Frontal margin of head. 36. Antenna 1. 36a. Tip of antenna 1. 37. Antenna 2 (basal article missing). 37a. Tip of antenna 2. 38. Mandible. 39. Maxilliped. 39a. Coupling hooks enlarged.

Gnathia ricardoi, spec. nov.
Figs 34-47

Types. Holotype: ♂, Brazil. São Paulo State, Ubatuba continental slope, Sta. 5365, 24°25'S, 44°16'5"W, 320 m depth, 07.12.1988, R/V "Prof. W. Besnard" coll. (MZSP, cat. No. 11513). – Paratypes: 11♂♂, idem (8 MZSP 11514, 4 MNRJ 3232); 4♂♂, 4♀♀, 1 praniza, Sta. 5361, 24°42'S, 44°30'5"W, 320 m depth, 06.12.1988, R/V "Prof. W. Besnard" coll. (5 MZSP 11515, 4 MNRJ 3233); 1♂♂, Sta. 5362, 24°48'8"S, 44°29'7"W, 520 m depth, 07.12.1988, R/V "Prof. W. Besnard" coll. (MZSP 11516).

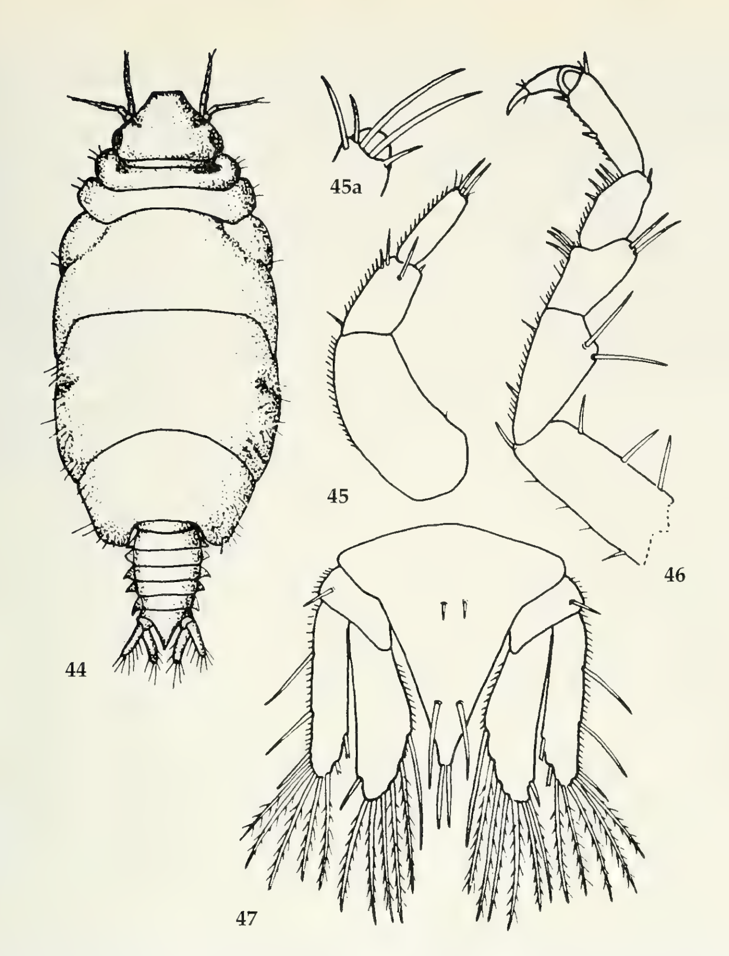
Additional material. Besides the selected types, 26 specimens in different growth stages were examined from the area of study.



Figs 40-43. *Gnathia ricardoi*, spec. nov., paratype adult male, 5.6 mm long. 40. Pylopod. 40a. Tip of pylopod. 41. Pereopod I. 42. Pereopod VI. 43. Pleopod 1.

Description

Holotype adult male 5.5 mm long (Fig. 34). Body about 3.2 times longer than wide, with many simple long setae laterally; few small tubercles laterally on head and pereonites II-III, laterally and centrally on pereonite IV. Head about 1.2 times longer than wide, frontal margin broadly protruded (Fig. 35), anterior and median dorsal surface depply excavated, 2 elongate latero-dorsal lobes, lamina dentata between mandibles visible in dorsal view, eyes lateral. Pereonite I 2.5 times shorter than pereonite II, laterally fused to head. Pereonites II-III almost subequal in length, both with lateral lobes. Pereonite IV almost twice pereonite I length, 2 large lateral lobes directed slightly backwards. Pereonite V largest, with lateral broadly rounded lobes. Pereonite VI posterior margin extending beyond pleonite 1, twice length of pereonite I, almost 4 times pereonite VII length. Pereonite VII longer than pleonite 1 with lateral margins straight. Pleon with five pleonites subequal in length, coxal plates visible in dorsal view; pleotelson triangular apex acute, bearing 2 terminal and 4 dorsal setae; uropodal endopods



Figs 44-47. *Gnathia ricardoi*, spec. nov. 44-46. Paratype adult female, 5.0 mm long. 47. Paratype adult male, 5.6 m long. 44. Dorsal view. 45. Pylopod. 45a. Tip of pylopod. 46. Pereopod I. 47. Pleotelson with uropods.

surpassing apex of pleotelson.

Antenna 1 (Fig. 36). Peduncle article 1 slightly longer than article 2, short setae along outer margin; article 3 as long as article 1 and 2 together. Flagellum of 5 articles, first article shortest, articles 3 to 5 with one distal elongate aestetasc.

Antenna 2 (Fig. 37). Three basal peduncle articles short; article 5 about 1.7 times length of article 4, slightly shorter than flagellum, with many elongate setae along distal margin. Peduncle of 7 articles elongating distally.

Mandible (Fig. 38) narrow, elongate, about 1/8 body length; frontal lamina barely dentate, with straight elongate apex; lateral carina with 1 apical seta. maxilliped (Fig. 39). Basis as long as palp articles 1-3 together, outer margin strongly curved, setose, inner margin straight with large elongate lobe bearing 2 coupling-hooks and many short setae; palpal articles having elongate plumose setae on outer margins, many short simple setae along inner margins.

Pylopod (Fig. 40) basal article nearly 4.5 times longer than following articles together, outer margin with row of two kinds of setae: plumose in the basal 2/3, simple in the distal third; article 2 rounded, about 10 times longer than apical article, lateral margins fringed with short setae.

Pereopod I (Fig. 41). Basis same length as ischium and merus together, many elongate fine hairy setae

and 2 conical spines along anterior margin, posterior margin densely setose; ischium about ¾ length of basis, many short and long setae along posterior margin, anterodistal corner bearing elongate setae; merus shorter than carpus, conical spine and many setae along posterior margin; carpus with 2 conical spines and long hairy setae on posterior margin; propodus twice length of dactylus, posterior margin basal half with scales; dactylus nearly twice as long as strong unguis, bearing apical simple seta.

Pereopod II similar to pereopod I, but ischium, merus and carpus having spiny posterior margins like pereopods III to V; basis with 8 plumose setae along anterior margin.

Pereopods III to V similar, slightly longer than precedents and more setose. Pereopod V (Fig. 42). Basis almost twice length of merus, anterior and posterior margins fringed with elongate fine hairy setae, wide and short conical spines along anterior margin; ischium nearly 1.4 length of merus, posterior margin densely setose bearing many short conical spines, 2 hairy and several elongate simple setae at distal anterior corner, merus slightly longer than carpus, posterior margin setose, many scales at anterior margin; carpus posterior margin fringed with spines, anterior margin bearing scales; propodus nearly 2.8 times longer than dactylus, posterior margin with scales and 2 elongate spines, anterior margin with scales and 3 elongate setae; dactylus twice length of stout curved unguis, short setae distally placed.

Pleopods sympod nearly 2.6 times shorter than endopod, 2 coupling setae in the basal third of inner margin, outer margin setose with distal elongate simple seta. Pleopod 1 (Fig. 43) endopod nearly 1.2 times longer than exopod, 5 translucent scales apically; pleopods 2 to 5 similar, having endopods with 8 apical scales, exopods with 8 or 9 scales.

Uropods (Fig. 47). Outer margin of sympod setose, dorsal surface with 1 long seta; endopod surpassing pleotelson apex, inner margin fringed with short simple setae, many plumose setae subapically and apically; exopod subequal in length to endopod, row of short setae and 3 elongate setae along outer margin, apex bearing many plumose setae.

Pleotelson (Fig. 47) slightly longer than wide, tapering posteriorly, ending in 2 elongate setae; 2 short and 2 long setae placed middorsally at basal ⅓ and distal ⅔, respectively.

Remarks. Adult males varied from 4.7 to 5.8 mm long, whereas juvenile males ranged from 2.2 to 2.5 mm long.

Ovigerous female, 5.2 mm long (Fig. 44). Body about 2.3 times longer than wide, widest at posterior margins ofr pereonites IV and V, yellowish, many setae along lateral margins of perionites. Cephalothorax thrice as long as pleon. Head about 3.7 times wider than long, mouthparts visible in dorsal view. Peronite I embedded in pereonite II, half length of pereonite II; pereonite II as long as III, both having lateral margins directed forwards; pereonite V longest, slightly longer than pereonite IV, 1.3 times longer than following pereonite; pereonite VI having incomplete anterolateral suture; pereonite VII shortest, about 10 times shorter than pereonite V. Pleonites subequal in length, coxal plates visible dorsally on all pleopods; pleotelson slightly wider than long, uropods surpassing pleotelson apex. Pylopod elongate (Fig. 45); article 1 twice longer than wide, lateral margin setose; article 2 wider and longer than following article, lateral and distal margins setose, some long setae distally; article 3 almost twice narrower than precedent article, lateral and apical margins bearing many short and 5 elongate setae respectively; apical article short, globose, about 14 times shorter than article 3, margins bare. Pereopods all similar to pereopod I. Pereopod I (fig. 46) basis anterior margin with 3 long setae; from ischium to carpus posterior margin fringed with short setae and scattered elongate ones; propodus twice longer than dactylus, many short setae and 2 spines placed at posterior margin; unguis curved, half length of dactylus.

Remarks. Of the 50 specimens which were collected 14 were adult females. Only one praniza was found. Gravid females had 50-60 eggs.

Distribution. Southeastern Brazil: São Paulo State, Ubatuba shelf break and slope.

Etymology. The species is named after my older son, Ricardo.

Habitat. *G. ricardoi* was found in muddy and sandy bottoms of the upper and central continental slope, between 134 and 530 m depth, with increased abundance at 320 m depth.

Taxonomic discussion. *Gnathia ricardoi* differs from all other described species of the genus by having the head broad and deeply excavated dorsally.

Ecological discussion

The three new species are quite different from each other morphologically. They also can be distinguished by their bathymetric distribution. *Gnathia ubatuba* occurs from inner shelf to the slope (33 to 320 m); the other two species are restricted to deeper and narrower ranges: *G. andrei* was collected between 134 and 180 m depth and *G. ricardoi* between 134 and 530 m. The depth distribution of the three species of gnathiid found in the continental shelf and upper slope in Ubatuba region is shown in Table 1.

Gnathia ubatuba occurred most abundantly in the warm waters of the Coastal Water, a tropical water mass ranging between 20 and 25 °C, even though many specimens were found in the deep and dense cold waters (13 to 17 °C) of the South Atlantic Central Water. This result shows that the species tolerate a wide range of temperature, salinity and depth, being numerous both in coastal and offshore waters.

Gnathia andrei exclusively was collected in the shelf break zone, which seems to indicate that species abundance may be related more to habitat type than to depth. This zone has a hard bottom formed by concretions of calcareous algae mixed with dead corals. In contrast, the deepest species, *Gnathia ricardoi*, also occurred in the shelf break area but was more frequent below 320 m.

Tab. 1. Distribution of the Gnahiidea in Ubatuba continental shelf and slope.

STA	DATE	LAT. (°S)	LONG (°W)	DEPTH (m)	TEMP (°C)	*Gnathia ubatuba*	*Gnathia andrei*	*Gnathia ricardoi*	*Bathygnathia magnifica*
1	26.10.85	2345	4500	46	16.54	3	0	0	0
2	26.10.85	2337	4503	35	16.79	1	0	0	0
17	22.01.86	2334	4448	44	15.83	2	0	0	0
21	18.04.86	2334	4507	20	25.13	1	0	0	0
32	10.07.86	2346	4509	35	22.20	1	0	0	0
34	11.07.86	2334	4443	48	17.93	1	0	0	0
4851	16.12.85	2336	4446	48	14.45	4	0	0	0
4852	16.12.85	2349	4439	70	15.03	58	0	0	0
4853	16.12.85	2401	4433	104	13.73	1	0	0	0
4854	17.12.85	2347	4458	47	14.87	1	0	0	0
4855	17.12.85	2357	4452	73	14.33	7	0	0	0
4856	17.12.85	2413	4445	116	14.13	39	0	0	0
4857	18.12.85	2351	4507	48	15.45	1	0	0	0
4858	18.12.85	2408	4501	76	14.43	16	0	0	0
4859	18.12.85	2422	4454	102	14.81	13	0	0	0
4931	23.07.86	2419	4413	188	–	74	0	0	0
4946	26.07.86	2336	4439	50	21.80	101	0	0	0
4947	26.07.86	2349	4439	77	16.72	5	0	0	0
4948	26.07.86	2401	4433	108	15.61	78	0	0	0
4949	27.07.86	2347	4458	50	21.38	1	0	0	0
4950	27.07.86	2357	4453	75	17.37	31	0	0	0
4951	27.07.86	2413	4445	117	15.81	56	0	0	0
4952	28.07.86	2356	4507	48	21.92	1	0	0	0
4953	28.07.86	2408	4501	79	18.66	19	0	0	0
4954	28.07.86	2422	4454	101	18.13	59	0	0	0
5120	10.07.87	2419	4440	134	15.17	163	10	0	0
5148	12.07.87	2414	4432	134	14.65	16	12	11	0
5170	13.07.87	2409	4422	136	14.75	106	11	0	0
5191	20.07.87	2436	4433	184	16.50	0	0	1	0
5192	20.07.87	2423	4424	180	15.28	2	2	0	0
5360	06.12.88	2435	4432	248	14.61	5	0	0	0
5361	06.12.88	2442	4430	320	15.14	2	0	10	0
5362	07.12.88	2448	4429	530	13.36	0	0	2	0
5365	07.12.88	2425	4416	320	12.51	5	0	13	0
5366	07.12.88	2422	4418	240	13.41	15	0	0	1
5361	08.12.88	2434	4426	350	13.25	0	0	6	0
5368	08.12.88	2431	4428	250	13.40	2	0	7	0

Even though *G. ubatuba* and *G. ricardoi* occupy a larger depth range, they also were very numerous on the hard substrata of the shelf break zone. That calcareous bottom, rich in small cavities, seems to be a suitable habitat for the gnathiids studies. *Gnathia abyssorum* and *G. calva*, among others (Klitgaard 1991, Wägele 1988) were abundant in hard bottoms with sponges, due to the narrow channels that exists in the sponges. The present data show that the abundance of the *Gnathia* studied seems to be strongly related to the kind and structure of the hard substrata present in the Brazilian shelf, rather than to depth.

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A new species of the genus *Anomotarus* Chaudoir from New Guinea

(Insecta, Coleoptera, Carabidae, Lebiinae)*

By **Martin Baehr**

Baehr, M. (1996): A new species of the genus *Anomotarus* Chaudoir from New Guinea (Insecta, Coleoptera, Carabidae, Lebiinae). – Spixiana **19/1:** 17-20

Anomotarus unicolor, spec. nov. is described from Papua New Guinea. It is perhaps rather closely related to the vividly patterned *A. ocellatus* Darlington, but is distinguished by the unicolorous surface, slightly metallic elytra, and even smaller size.

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Introduction

Within the very interesting collections made by A. Riedel, Friedberg, on several occasions and in several parts of New Guinea I discovered a single specimen of a peculiar unpatterned species of the lebiine genus *Anomotarus*, s. str. According to shape and structure of pronotum and elytra and to structure of microsculpture of surface it belongs to the group of species related to *A. ocellatus* (*A. ocellatus* Darlington, *A. transversus* Darlington, *A. ornatus* Louwerens, *A. fuscipes* Darlington, and *A. wau* Darlington, see Darlington 1968), but is distinguished from all mentioned species by absence of elytral markings, slightly metallic lustre of elytra and pronotum, and by its extremely small size.

The holotype is donated to the Zoologische Staatssammlung, München, but retained as permanent loan in the collection of author (ZSM-CBM).

Measurements

Measurements were made under a stereo microscope using an ocular micrometer. Length has been measured from tip of labrum to apex of elytra, hence, measurements may slightly differ from those of Darlington (1968).

Anomotarus unicolor, spec. nov.

Figs 1, 2

Types. Holotype: ♀, PNG, Morobe-Pr. Aseki, 1500-1650 m, 14.9.1992, leg. A. Riedel (ZSM-CBM).

Diagnosis. Easily distinguished from all New Guinean species by the unicolourous surface; further distinguished from the species related to *A. stigmula* (Chaudoir) by the wider, not heart-shaped pronotum, depressed elytral intervals, and far less distinct microreticulation; and from the species related to *A. ocellatus* Darlington by smaller size and slightly bronzed metallic colour of elytra and pronotum.

* Results of the entomological explorations of A. Riedel in New Guinea in 1992.

Description

Measurements. Length: 3.85 mm; width: 1.5 mm. Ratios. Width pronotum/head: 1.16; width/length of pronotum: 1.32; width base/apex of pronotum: 1.0; length/width of elytra: 1.41; width elytra/pronotum: 1.57.

Colour. Upper surface and most of lower surface glossy black, though pronotum with slight and elytra with distinct metallic lustre, the latter also with reddish translucent margin. Labrum piceous with lighter margins, median parts of meso- and metathorax, and of abdomen dark piceous, the palpi, antenna, and tibiae and tarsi reddish, femora piceous.

Head. Large and wide, neck short and wide, without any impression between frons and neck. Eyes large, laterally slightly more protruding than orbits, the latter about half as long as eyes, rather convex. Labrum large, anteriorly slightly concave. Mandibles short, evenly rounded, apex blunt. Maxillar palpi elongate, apex slightly truncate. Labial palpi barely widened, not securiform, apex oliquely truncate. Mentum with acute tooth. Antenna rather short and stout, surpassing base of pronotum by c. 1 ½ antennomeres, subapical antennomeres ovalish, c. 1.3 × as long as wide. Antenna pilose from 4th antennomere. Frons with a fine carina immediately near eye that slightly surpasses the middle of eye. Upper surface of head except for labrum with rather superficial, though distinct, isodiametric microreticulation and with very fine and sparse punctures, rather glossy. Labrum with very superficial microreticulation. Anterolateral margin of labrum with some pilosity. Lower surface with extremely short and fine, very sparse pilosity.

Pronotum. Short and wide, wider than in most other species, considerably wider than head, with comparatively wide base, not at all cordiform. Disk fairly convex. Apex moderately excised, apical angles slightly protruded, though rounded off. Lateral border evenly curved, without any sinuosity in front of basal angles. The latter small, slightly dentiform. Lateral parts of base moderately oblique, median part slightly projecting. Apex in middle unbordered, lateral channel rather narrow, lateral margin little explanate, base markedly bordered. Median line fine, not touching base, ending at the very shallow anterior transversal sulcus. Disk regularly convex, without distinct basal grooves, though laterally on either side with a shallow, elongate groove. Posterior lateral seta at basal angle, anterior lateral seta situated in anterior third. Surface with very fine transverse sulci, microreticulation in middle very superficial, becoming more evident laterally, consists of about isodiametric to slightly transverse meshes. Puncturation very fine and sparse. Surface with extremely short and fine, rather sparse, almost invisible pilosity, rather glossy.

Elytra. Rather short and wide, posteriorly moderately widened, widest diameter in apical third. Upper surface comparatively convex, though on disk depressed. Shoulders comparatively wide. projecting, though widely rounded off. Lateral border faintly convex throughout, apex slightly sinuate. Marginal channel rather wide. Striae shallow, finely and irregularly punctulate, intervals depressed, only in basal third faintly convex, impunctate. 3rd interval with two setiferous punctures just in front of middle and behind basal third. Intervals with superficial, rather indistinct, irregularly transverse microreticulation, with extremely short and fine, rather sparse, almost invisible pilosity. Surface glossy. Wings fully developed.

Lower surface. Without microreticulation, glossy, with extremely short and fine, rather sparse, almost invisible pilosity. Metepisternum about 2 × as long as wide. Abdominal sterna with one ambulatory seta on either side, terminal sternum in female near apical margin with two setae on either side.

Legs. Rather stout, surface of femora and tibia fairly sparsely pilose. Claws with 2-3 rather elongate teeth. Vestiture of male protarsus unknown.

Male genitalia. Unknown.

Female genitalia (Fig. 2). Stylomere 1 elongate, basally deeply cleft, stylomere 2 elongate, almost parallel, straight, at apex with several very short hairs. The stylus is rather similar to that of *A. stigmula* (Chaudoir) figured by Habu (1967, fig. 40).

Variation. Unknown.

Distribution. Central eastern Papua New Guinea. Known only from type locality.

Habits. Largely unknown. Probably collected by sieving leaf litter in montane rain forest at median altitude.

Etymology. The name refers to the unpatterned surface of the elytra.

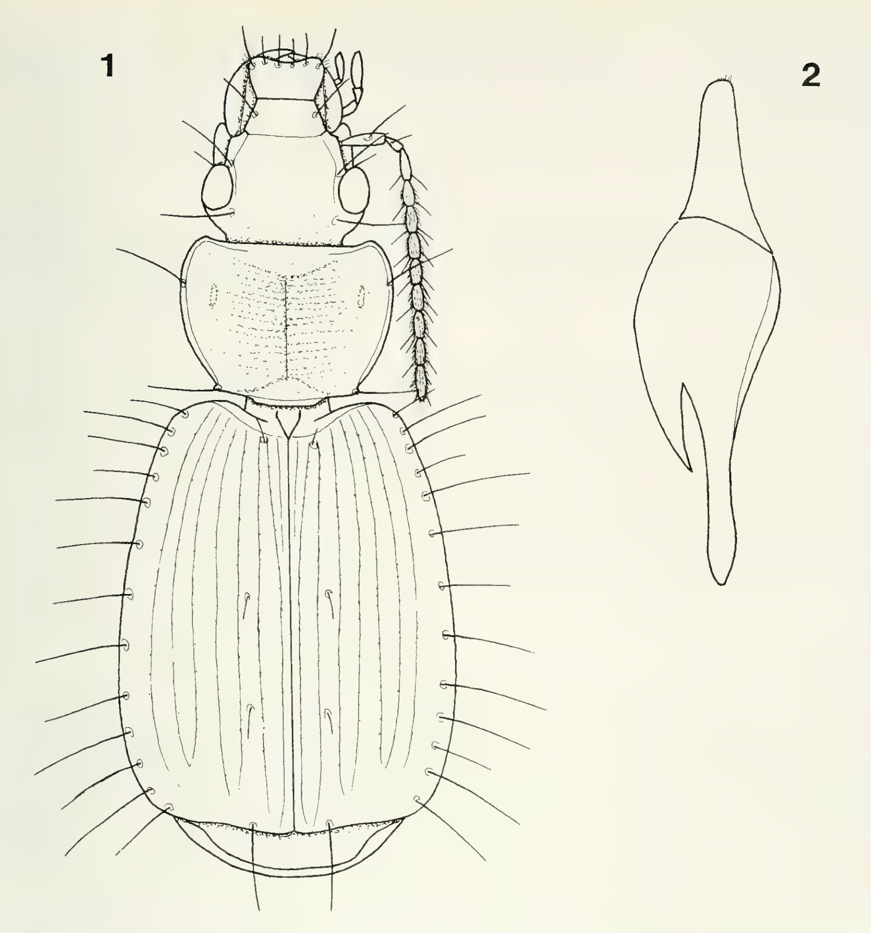


Fig. 1, 2. *Anomotarus unicolor*, spec. nov. 1. Habitus. Length (to apex of abdomen): 4.05 mm. 2. Female stylomeres. Length: 0.3 mm.

Remarks

According to shape of pronotum, structure of elytral striae, and the rather weak microreticulation of the surface, especially the elytra, this species belongs to the group of species related to *A. ocellatus* Darlington that at present includes five rather closely related species. They occurr mainly in New Guinea, though not in Australia, and one of them (*A. ornatus* Louwerens) ranges also to the Moluccas and the Philippine Islands.

Certainly this species group is rather evolved as compared with the group of species related to *A. stigmula* Chaudoir, not only due to the generally bright patterns the known species bear, but also due to the wide, rather convex body shape and the inconspicuous microsculpture of the surface. Perhaps the new species has lost secondarily the distinctive pattern, and this, together with the very weak microreticulation of the surface, the slightly metallic colour of the elytra, and the very small size, would render it one of the most evolved species of the genus. However, this is at present yet uncertain, but will be perhaps clarified in a revision of the Australian species of the genus I am planning for the next future.

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Review of Palearctic species of *Crepidodera* Chevrolat

(Coleoptera, Chrysomelidae, Alticinae)

By **Alexander S. Konstantinov**

Konstantinov, A. S. (1996): Review of Palearctic species of *Crepidodera* Chevrolat (Coleoptera, Chrysomelidae, Alticinae). – Spixiana **19/1:** 21-37

Morphological characteristics of the genus are provided. Species status of two forms are re-established. Illustrations of the morphological characters of the genus, and female and male genitalia of species are provided. A key for identification of the 15 Palearctic *Crepidodera* species is presented. Two new species of *Crepidodera* are described: *C. sahalinensis* (type locality environs of Gornozavodsk, Sahalin, Russia), *C. ussuriensis* (type locality Kamenushka, Ussuriisk distr., Far East, Russia).

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Introduction

The genus *Crepidodera* Chevrolat is less species-rich than most cosmopolitan Alticinae genera. The greatest diversity (31 species) is found in the Holarctic, while a single species is known from the Oriental region (Heikertinger & Csiki 1939). The Oceanic Islands are disproportionately represented, with 15 species recognized in the revision of Samuelson (1973). The Neotropical fauna, probably the most poorly known, contains only 14 species according to Bechyne (1955) and Arnett (1983). The Nearctic fauna has received the greatest attention from systematists: Lazorko (1974) and Parry (1986) recounted 16 species, 11 of them new. The last author created a key for identification Nearctic species, and re-established the species status for *C. nana* Say. For the Palearctic fauna after a single revision of Heikertinger (1950), 3 new species were described (Gressitt & Kimoto 1963, Warchalowski 1969, Doguet 1976a). Doguet (1976b) examined the type of *C. picipes* Weise. After this study it became clear that Gressitt & Kimoto (1963) and Warchalowski (1969) were mistaken in their concept of *C. picipes* Weise, and A. Warchalowski (1969) had redescribed Weise's species under the name of *mroczkowskii.*

In the Holoarctic, *Crepidodera* commonly feeds on trees and bushes of *Salix, Populus* and *Prunus;* thus its greatest diversity occurs in lowland and lower montane forest habitats. Some species (*C. nana* Say in North America and *C. fulvicornis* F. in Eurasia) may occur in sufficient numbers to cause significant damage to willows.

The present study was based on material from the collection of Zoological Institute RAS in St. Petersburg (ZMAS), Zoological Museum of Moscow University in Moscow (ZMMU), Institute of Evolutionary Morphology and Ecology of Animals RAS in Moscow (IMEA), Zoological Museum of Byelorussian University (ZMBU), Institute of Zoology Ukranian, in Kiev (IZAB) Academy of sciences, National Museum of Natural History, Washington (USNM), Natural History Museum in Basel (NHBM) and on the private collection of I. K. Lopatin in Minsk (ILPM), S. Doguet in Paris (SDCF), M. Biondi in Rome (MBCI), and the author (AKPM).

Morphology of *Crepidodera*

The boundary between *Crepidodera* and closely related genera in the Palearctic is clear, but in the Neotropical fauna the distinction is much more obscure. Even in North America some species exist (*C. longula* Horn for example) which lose their metallic color and come to resemble species of *Asiorestia* Jacobson. Therefore a short morphological characterization of Holoarctic *Crepidodera* is provided. Only key diagnostic characters are included (Konstantinov & Lopatin 1987).

The head capsule (Figs 1-3) has a rounded and slightly elongate shape. The frontal ridge is narrow and sharp. It forms an inverted T-shaped ridge with the clypeus. There are two furrows for reception of the first antennal segments between the antennal cavities and lateral margin of the mouth. Antennal calli are narrow, contigiuous and separated from the top of the frontal ridge. The most important character of the head capsule of *Crepidodera* is the absence of the hypostomal suture.

The mouthparts (Figs 4-7). The labrum has a characteristic alticine shape and 6 setiferous pores on the dorsal surface. The mandibles have 5 teeth and wide prosteca, covered with numerous short setae. The maxillae have unusual basistipes with two appendages bearing long setae. This type of basistipes is nearly unique among Palearctic genera. Only the basistipes of *Podagrica* Foud. has a similar shape. The labium has a very small first segment of the labial palpi and greatly enlarged second one.

The pronotum (Figs 8-21) has a deep transverse impression near the basal margin, bounded on either side by short, longitiudinally impressed lines. Meso- and metanotum are as in figs. 22 and 23.

The metendosternite (furca) (Figs 24-26) is very similar to the metendosternite ancestral for Alticinae (Konstantinov & Lopatin 1987) but differs in the shape of the stem. The stem of *Crepidodera* has a wide base with parallel sides in basal ⅔, tapering in apical ⅓ near the branches.

The female genitalia (Figs 27-47) also has a form which is considered primitive among Palearctic Alticinae. The 7th tergite and sternite are strongly sclerotized and covered with many ridges (Figs 27, 28). The most primitive feature is the presence of the 9th tergite. However Cryptocephalinae and the majority of Chrysomelinae have lost this segment (Konstantinov & Rusakov 1993). Sternites 8 and 9 are modified to form a tignum (Fig. 29) and styli (Figs 30-34). The most important feature of the *Crepidodera* tignum is two dilations, basal and distal. The distal one is Y-shaped. The size and the shape of styli are different in each species, but the value of this structure for species identification needs verification. The spermatheca (Figs 35-47) of the majority of Holoarctic species has a distinct border between apical and basal parts. There is no such border in the spermatheca of *C. lamina* Bedel and *C. aurea* Goeff. which exhibit the primitive condition found in *Altica* F.

The male genitalia (Figs 48-60) contains useful distinguishing features for identification of species.

Key for the Palearctic species of *Crepidodera* Chevr.

1. Apical angles of elytra with small tooth. Punctural rows of elytra irregular on disc .... *C. nitidula* L.
– Apical angles of elytra without tooth. Punctural rows of elytra regular on disc .... 2.

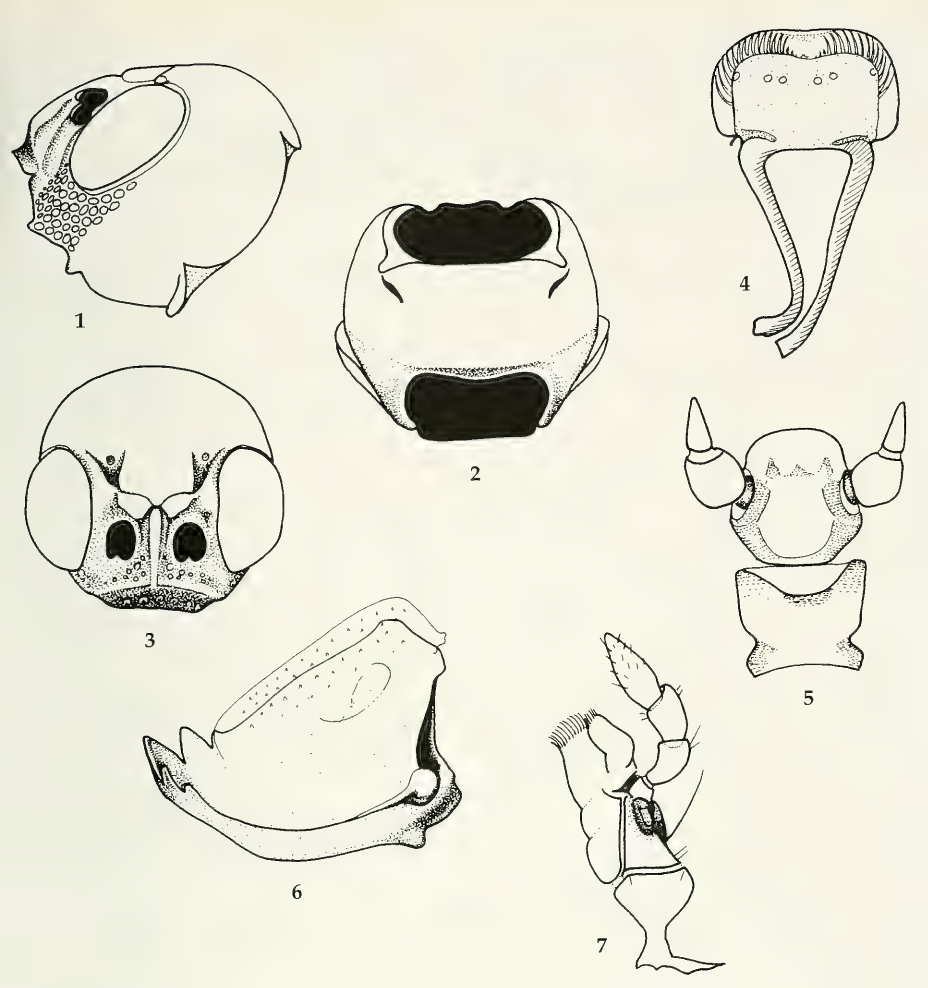
2. First and second antennal segments yellow .... 3.
– Antennal segments 1 and 2 light brown .... 13.

3. Antennae entirely yellow, except 3 apical segments brown .... 4.
– Antennal segments 3-6 brown, 3 apical segments dark brown .... 6.

4. Frons densely covered with transverse wrinkles. Anterior pronotal angles rounded. Pronotal punctures large, subequal in size .... *C. gemmata* Ab.
– Frons without wrinkles. Anterior pronotal angles sharp. Pronotum covered with different sized punctures .... 5.

5. Frons smooth, shiny, covered with small punctures .... *C. lamina* Bed.
– Frons dull, covered with large punctures, some of them irregularly shaped .... *C. aurea* Geoffr.

6. ♂ Antennal segment 5 bicolorous: base yellow, apex dark brown or black .... 7.
– Antennal segment 5 unicolourous yellow, or with apex slightly darker than base .... 8.



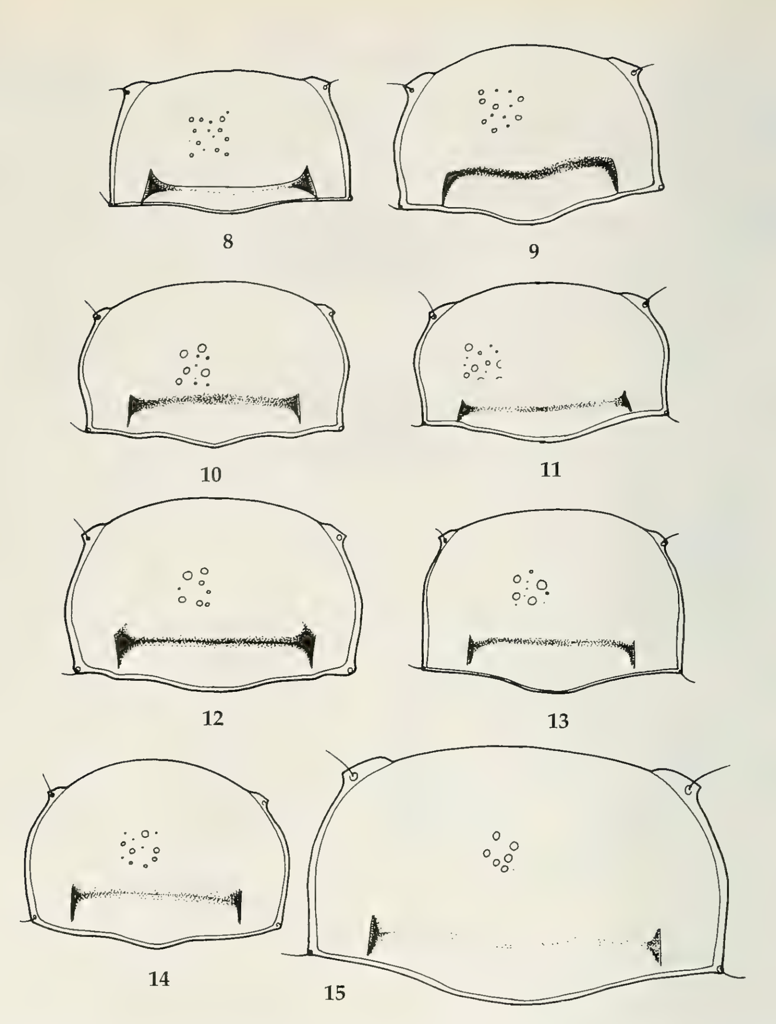
Figs 1-3. Head capsule of *Crepidodera lamina* Bed. 1. Lateral view. 2. Dorsal view. 3. Frontal view.
Figs 4-7. Mouth parts of *C. lamina* Bed. 4. Labrum. 5. Labium. 6. Mandible. 7. Maxilla.

7. Pro-, meso- and metafemur dark at middle, transverse and longitudinal furrows deep with sharp margins .... *C. sahalinensis*, spec. nov.
– Pro-, meso- and metafemora yellow, transverse and longitudinal furrows deep without sharp margins .... *C. plutus* Latr.

8. Dorsum bicolorous: head and pronotum golden green or copper red, elytra dark green, blue or violet .... 9.
– Dorsum unicolorous, or pronotum differs from elytra by weak copper lustre .... 10.

9. Metafemur black. Aedeagus with round apex .... *C. aurata* Marsh.
– Metafemur light brown. Aedeagus with sharp apex .... *C. nigricoxis* All.

10. Pro- and mesofemur yellow .... *C. fulvicornis* F.
– At least mesofemur brown or black .... 11.



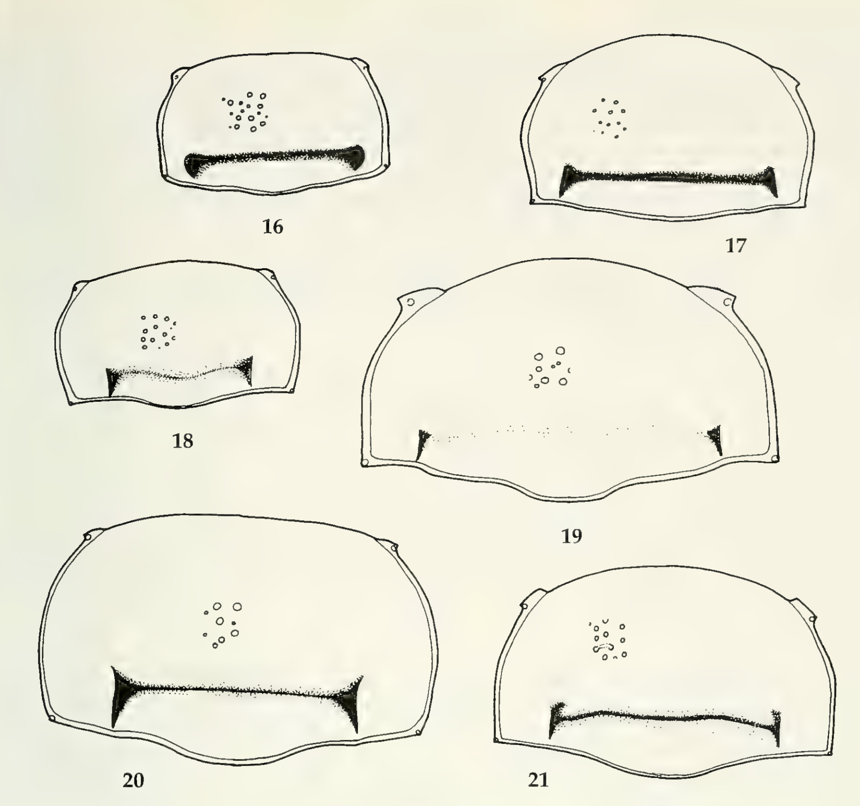
Figs 8-15. Pronotum of *Crepidodera*, dorsal view. 98. *C. aurea* Geoffr. 9. *C. obscuripes* Heik. 10. *C. fulvicornis* F. 11. *C. japonica* Baly. 12. *C. aurata* Marsh. 13. *C. plutus* Latr. 14. *C. sahalinensis*, spec. nov. 15. *C. lamina* Bed.

11. Dorsum dark blue or dark green. Body wide .... 12.
– Dorsum light green or copper bronze. Body narrow .... *C. japonica* Baly

12. Pronotum with lateral margin straight at basal ⅓. Middle of frons without punctures .... *C. wittmeri* Doguet
– Pronotum with lateral margin curved at basal ⅓, middle of frons with round densely puncturate impression .... *C. obscuripes* Heik.

13. Legs dark brown or black .... *C. picipes* Weise
– Pro- and mesotibia yellow .... 14.

14. Length more than 4 mm. Body bright metallic green .... *C. viridis* Gr. & Kim.
– Length less than 3 mm. Body dark blue .... *C. ussuriensis*, spec. nov.



Figs 16-21. Pronotum of *Crepidodera*, dorsal view. 16. *C. gemmata* Abeil. 17. *C. picipes* Wse. 18. *C. ussuriensis*, spec. nov. 19. *C. viridis* Gr. & Kim. 20. *C. nitidula* L. 21. *C. wittmeri* Doguet.

Survey of the Palearctic species of *Crepidodera* Chevrolat

Genus *Crepidodera* Chevrolat

Crepidodera Chevrolat, 1837: 415; Maulik 1926: 234; Gressitt & Kimito 1963: 773.
Chalcoides Foudras, 1859 (1860): 147; Heikertinger 1950: 106; Mohr 1966: 247.

Type species: *Chrysomela nitidula* L., designated by Maulik, 1926: 234.

Crepidodera aurea (Geoffroy)
Figs 8, 22, 23, 24, 35, 48

Altica aurea Geoffroy, 1785: 100.
Chalcoides aurea, Bedel 1901: 298; Heikertinger 1950: 110; Shapiro 1965: 451; Mohr 1966: 248; Gruev & Tomov 1986: 270. *Crepidodera aurea*, Lopatin 1979: 227.

Material. England, Ongar, 29.05.1949, F. D. Buck (USNM); Germany, Bayerischer Wald, 19.05.1967, M. Döberl (USNM); Austria, Wien, 25.08.1905, F. Heikertinger (USNM); Russia: Kodyma, 08.06.1902, Bazhenov (ZMAS); Podol'sk, Verhovka, 26.05.1921, Chekini (ZMAS); Kursk distr., Golubkino, 17.05.1898, Lindeman (ZMAS); Ukraine: Crimea, Pendzhikul-Ugan-Su, 22.05.1932, Reihardt (ZMAS); Georgia: Akhaldaba, 12.07.1983, A. Konstantinov (ZMBU).

Redescription

Body wide, oval. Dorsal surface cupreous, green, dark-blue or violet with bronze lustre, pronotum and elytra concolorous. Antenna, with exception of last 3 segments, front and middle legs, metatibiae and all tarsi yellow. Last 3 antennal segments and metafemora brown. Antennal calli transverse, well separated from frons. Frons mat, covered with large puntures. Pronotum wide, transverse; longitudinal furrows shallow. Posterior angles acute with deep setiferous pores. Punctures comparatively small. Elytra with regular rows of small punctures. Diameter of punctures less than distances between rows. Intervals between rows shiny, minutely puncturated.

Length: 2.5-3.8 mm.

Distribution: Europe, Caucasus, Asia Minor North and East Kazakhstan, West Siberia.

Host plants: *Salix caprea, Populus tremula, P. nigra.*

Crepidodera obscuripes (Heikertinger)

Figs 9, 33, 36, 49

Chalcoides obscuripes Heikertinger, 1912: 104.

Chalcoides aurea obscuripes, Heikertinger 1950: 111; Medvedev 1992: 586.

Crepidodera picipes, Gressitt & Kimoto 1963: 773; Warchalowski 1969: 231 (misidentification).

Material. Siberia: Krasnojarsk, 1900, Sahberg (ZMAS); Odarikovskii zavod, 5.08., A. Cherskii (ZMAS); Primorskii krai, Evseevka, 01.05.1910, W. Shingarev (ZMAS); Ussuriiskii krai, Jakovlevka, 18.05.1926, Diakonov, Filip'ev (ZMAS); Far East, Barabash-Levada, 26.07.1972, Konovalov (ZMBU); Dichun, 22.06.1978, Konovalov (ZMBU).

Redescription

Body suboval, wide. Dorsal surface dark-blue or violet, shiny. Pronotum and elytra concolorous. Pro- and mesotibia, tarsi and 4 or 5 basal antennal segments yellow. Metafemur and metatibia dark brown. Pro- and mesofemur dark yellow to brown. Antennal calli well separated from frons. Frons mat, with small and shallow transverse furrow covered with puntures. Pronotum wide with deep transverse and longitudinal furrows. Basal 1/3 of lateral margin slightly concave. Posterior angles acute. Elytra with quite striae rows. Punctures of striae comparatively large, diameter of a puncture almost equal to distance between rows. Intervals covered with small wrinkles and minute punctures.

Length: 2.6-3.7 mm.

Distribution: East Siberia, Far East, Mongolia, Korea, China.

Host plants: *Salix* sp.

Comments. Heikertinger (1950) regarded this species as a subspecies of *C. aurea* Geoffr., but it has unique form of aedeagus, and may also be separated from *C. aurea* by the puncturation and form of the frons, and by the shape of the lateral pronotal margin. Gressitt & Kimoto (1963) mentioned this species from China under the name of *picipes*, but *C. aurea* and *C. picipes* differ in the form of the aedeagus and may be easily separated using this character.

Crepidodera fulvicornis (Fabricius)

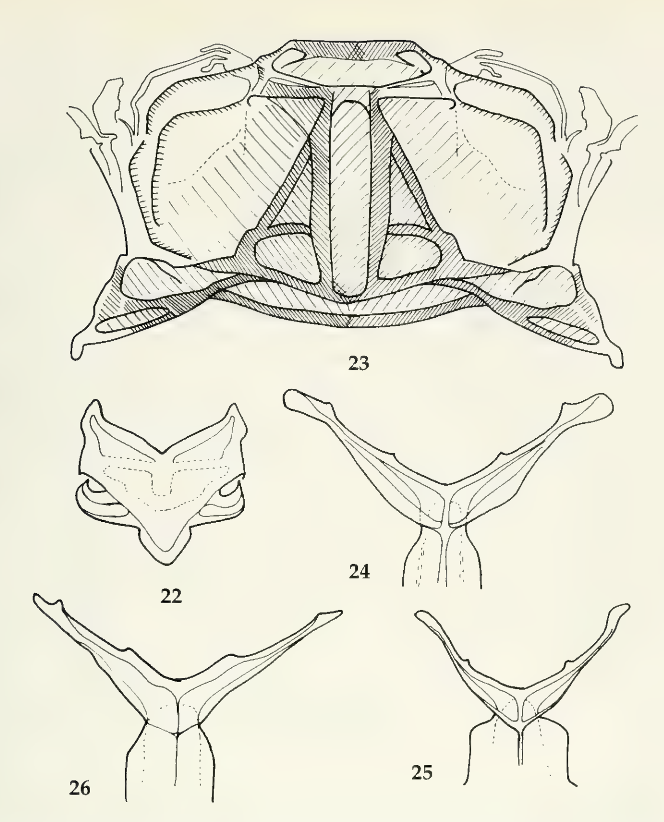
Figs 10, 25, 37, 50

Galeruca fulvicornis Fabricius, 1792: 30.

Chalcoides fulvicornis, Heikertinger & Csiki 1939: 317; Shapiro 1965: 451; Mohr 1966: 248; Gruev & Tomov 1986: 271.

Crepidodera fulvicornis, Lopatin 1979: 226; Medvedev 1982: 276.

Material. England: Gloucester, 24.08.1966, (USNM); Germany: Württemberg, 10.06.1979, M. Döberl (USNM); Bayerischer Wald, 19.05.1967, M. Döberl (USNM); Byelorussia: Minsk, 05.05.1985, I. Lopatin (ILPM); Braslov, 06.07.1981, A. Konstantinov (AKPM); Turov, 11.05.1980, A. Konstantinov (ZMBU); Russia: Leningrad, 12.06.1953 (ZMAS); Murmansk, 05.1921 (ZMAS); Arhangelsk distr., 12.08.1967 (ZMMU); Smolensk distr., 12.08.1979 A. Konstantinov (AKPM); the same place, 08.-22.08.1980 A. Konstantinov (AKPM); Moscow distr., V, VI, (ZMAS);



Figs 22, 23. Thorax of *C. aurea* Geoffr. 22. Mesonotum. 23. Metanotum.
Figs 24-26. Metendosternite of *Crepidodera*. 24. *C. aurea* Geoffr. 25. *C. fulvicornis* F. 26. *C. lamina* Bed.

Perm distr., Kamenka, 28.05.1965 (ZMAS); Lysvinskii reg., 23.05.1963 (ZMAS); Caucasus: North Caucasus, 12.06.1960 (IMEA); Tuapse, 11.06.1981, A. Konstantinov (AKPM); Krasnaia Poliana, 23.06.1981; the same place, 14.06.1984, A. Konstantinov (ZMBU); Lagonaki, 29.06.1990, A. Konstantinov (ZMBU); Abhasia, Suhumi, 24.06.1984, A. Konstantinov (AKPM); Pitzunda, 03.08.1983, A. Konstantinov (AKPB); Georgia, Ahaldaba, 22.07.1983 (ZMBU); Bakuriani, 15.07.1983, A. Konstantinov (ZMBU); Borzhomi, 14.07.1983, A. Konstantinov (AKPM).

Redescription

Body elongate. Dorsal surface bronze, metallic green or dark blue. Sometimes pronotum and elytra differently colored. Front and middle legs, metatibia and all tarsi, first 5 antennal segments yellow. Metafemur and last 6 antennal segments brown. Frons covered with comparatively large punctures above antennal calli. Frons surface shiny, with few irregular, shallow excavations. Pronotum with deep transverse furrow, but longitudinal ones more shallow. Lateral sides of pronotum concave in basal ⅓. Surface covered with very large, irregularly placed punctures with small punctures scattered between large ones. Elytra with regular rows of comparatively small punctures. Their diameter slightly smaller than the distances between punctures. Intervals shiny and covered with small punctures.

Length: 2.0-3.1 mm.

Distribution: Europe, Caucasus, Asia Minor, North Kazakhstan, Siberia.

Host plants: *Salix caprea, S. alba, Populus tremula, P. nigra.*

Crepidodera japonica Baly
Figs 11, 38, 51

Crepidodera japonica Baly, 1877: 169; Kimoto 1965: 425.
Crepidodera fulvicornis, Medvedev 1992: 586.

Material. Sahalin, 8.-10.07.1985, S. Saluk (AKPM); Sahalin, Chehov, 07.08.1992, A. Konstantinov (AKPM); Gornozavodsk, 12.08.1992, A. Konstantinov (AKPM); Kurilian Islands, Kunashir, 15.07.1985, S. Saluk (ZMBU); Japan: Hokaido, Jozakei, 07.08.1952 (USNM); Kuo Honshu, 25.08.1931 (USNM).

Redescription

Body elongate, comparatively small. Dorsal surface metallic green. Pronotum of some specimens with bronze lustre. Metafemur black; first 4 antennal segments yellow, rest dark brown. Remaining parts of legs variable in color: pro- and mesofemora, metatibiae brown to black. Pro- and mesotibiae yellow to dark brown. Antennal calli wide at base. Frons covered with small transverse wrinkles. Pronotum with deep longitudinal furrows, transverse furrow shallow. Lateral sides concave in basal ⅓. Posterior angles acute. Pronotal surface covered with puntures of different sizes. Largest punctures close. Striae of elytra completely mixed at the apex.
Length: 2.1-2.8 mm.

Distribution: Russian Far East (Sahalin), Japan (Hokaido, Honshu).

Host plants: *Salix gracilistula, S. sachalinensis, S. subfragilis.*

Comments. Gressitt & Kimoto (1963) and Medvedev (1992) considered this species a synonym of *C. fulvicornis*. However the legs' color, shape and punctation of pronotum, wrinkles of frons and shape of aedeagus prove that this is a valid species.

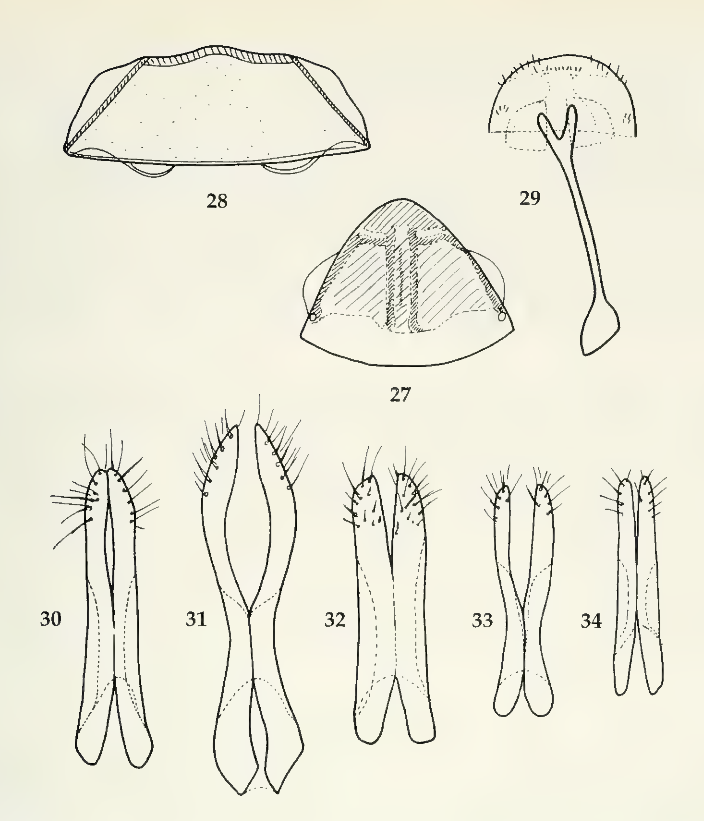
Crepidodera aurata (Marsham)
Figs 12, 39, 52

Chrysomela aurata Marsham, 1802: 195.
Chalcoides aurata, Heikertinger & Csiki 1939: 314; Shapiro 1965: 452; Mohr 1966: 248; Gruev & Tomov 1986: 272.
Crepidodera aurata, Gressitt & Kimoto 1963: 713; Lopatin 1979: 226; Medvedev 1982: 276.
Crepidodera aureola Foudras, **???** ; Biondi 1990: 166.

Material. England, Glochester, 24.08.1966, Krauss (USNM); Austria, Wien, Heikertinger (USNM); Spain, Alija de la Ribera, 11.03.1984, T. Velasco (MBCI); Romania, Bucurest, Montandon (USNM); Byelorussia: Beresinskii preserv, 06.07.1980, A. Konstantinov (ZMBU); Minsk, 05.05.1977, A. Konstantinov (AKPM); Plestchinitsy, 08.07.1977, A. Konstantinov (ZMBU); Vitebsk distr., 15.09.1979, A. Konstantinov (AKPM); Vileika reg. 23.07.1984; the same place, 05.05.1991, A. Konstantinov (AKPM); Turov, 16.05.,1980, A. Konstantinov (ZMBU); Russia: Jaroslavl distr., 24.05.1926 (ZMMU); Smolensk distr., Temkino, 14.08.1979, A. Konstantinov (AKPM); the same place, 08.08.1980, A. Konstantinov (AKPM); Moscow distr., 04.1923 (ZMMU); Perm distr., Lysvinkii reg., 23.05.1963 (ZMMU); Volgograd, 02.06.1986, Komarov, (AKPM); Stavropol, 17.05.1923 (ZMAS); Far East, Barabash-Levada, 18.07.1982, Konovalov (AKPM); Caucasus: North Caucasus, Lagonaki, 21.06.1990, A. Konstantinov (ZMBU); Krasnaia Poliana, 14.06.1984, A. Konstantinov (AKPM); Abhasia, Pitzunda, 02.08.1983, A. Konstantinov (AKPM); Georgia, Hashuri, 22.07.1983, A. Konstantinov (AKPM); Armenia, Hosrov, 15.05.1988, (IZAE); Azerbaidzhan, Lerik, 18.05.1986, (IZAB); Iran, Trapezond, 28.05.1891, Eichler (ZMAS).

Redescription

Body elongate. Elytra metallic blue or green. Pronotum cupreous, bronze or metallic green with bronze lustre. Pronotum and elytra different in color. Front and middle legs, metatibia, tarsi and first 5 antennal segments yellow. Metafemur and last 6 antennal segments dark brown or black. Antennal calli flat. Surface of frons with small wrinkles and tiny punctures. Pronotum with transverse and longitudinal furrows equally deep. Lateral sides straight in basal ⅓. Pronotal puncturation extremely variable. Caucasian specimens have large and dense punctures, sometimes 3 or 4 running together. Punctural rows of elytra regular and slightly mixed at apex.
Length: 2.3-3.1 mm.



Figs 27-29. Female genitalia of *C. lamina* Bed. 27. VII tergite. 28. VII sternite. 29. VII and IX tergite, and tignum. Figs 30-34. Styli of *Crepidodera*. 30. *C. browni* Parry. 31. *C. lamina* Bed. 32. *C. nana* Say. 33. *C. obscuripes* Heik. 34. *C. violacea* Melsh.

Distribution: Europe, North Africa, Caucasus, Asia Minor, Siberia, Mongolia, Far East, China.

Host plants: *Salix alba, S. triandra, S. fragilis, S. caprea, S. viminalis, Populus nigra, P. tremula.*

Comments. M. Biondi (1990) reestablished the species status of *C. aureola* Foud. from Spain, which was previously considered as synonym of *C. fulvicornis* (Heikertinger & Csiki, 1939). The comprehensive study of specimens considered to be *C. aureola* have proven that they are *C. aurata.*

Crepidodera nigricoxis Allard
Figs 40, 53

Crepidodera nigricoxis Allard, 1878: 17, 84.
Chalcoides nigricoxis, Gruev 1975: 90-93; Gruev & Tomov 1986: 273.

Material. Caucasus, Tuapse, 12.06.1982, A. Konstantinov (AKPM).

Redescription as for *C. aurata* except for the shape of aedeagus (Fig. 53).

Distribution: South East Europe, Caucasus.

Host plants: Unknown.

Crepdidodera plutus (Latreille)
Figs 13, 41, 54

Altica pluta Latreille, 1804: 7.
Chalcoides plutus, Heikertinger & Csiki 1939: 323; Shapiro 1965: 452; Mohr 1966: 247; Gruev & Tomov 1986: 274.
Crepidodera plutus, Gressitt & Kimoto 1963: 774; Lopatin 1979: 226; Medvedev 1982: 276; Medvedev 1992: 568.

Material. Germany, Berlin (USNM); Austria: Neusiedlersee, 25.08.1969, M. Döberl (USNM); Edmundshof, 28.08.1969, M. Döberl (USNM); Wien, Heikertinger (USNM); Byelorussia, Hvoensk, 27.06.1980, A. Konstantinov (AKPM); Ukraine, Poltava, 13.06.1925, (IZUK); Russia: Krasnodar, 16.04.1985, Ohrimenko (ZMBU); Krasnodar, Kuban' river, 18.06.1990, A. Konstantinov (AKPM); Far East, Amur, 31.05.1910, Soldatov (ZMAS); Vladivostok, 07.05.1958, Stepanov (ZMAS); Ussuriisk distr., Kamenushka, 21.08.1992, A. Konstantinov (ZMBU); Hanka, Kamen' Rybolov, 29.08.1992, A. Konstantinov (AKPM).

Redescription

Body elongate, comparatively narrow. Dorsum metallic green or blue; often with green pronotum and blue elytra. Front and middle legs, metatibiae and all tarsi, 4th and basal part of 5th antennal segments yellow. Apex of 5th and following antennal segments, metafemur dark brown or black. Frons with longitudinal excavation above antennal calli. Bottom of excavation covered with large punctures. Pronotal transverse and longitudinal furrows shallow. Lateral sides straight in the basal ⅓. Front angles comparatively short. Puncturation coarse. Elytral rows of large punctures regular. Diameter of punctures exceeding distance between rows. Intervals covered with small punctures and wrinkles.
Length: 1.9-2.8 mm.

Distribution: Europe, Caucasus, Asia Minor, Kazahstan, Central Asia, Far East, China.

Host plants: *Salix daphnoides, S.* spp. *Populus* spp.

Crepidodera sahalinensis, spec. nov.
Figs 14, 42, 55

Types. Holotype: ♂, Sahalin, Gornozavodsk, 11.08.1992, A. Konstantinov (USNM). - Paratypes: 1♂, same data as holotype; 1♂, 1 ♀, Kunashir island, 16.07.1985, S. Saluk (1♂ ZMAS, rest in AKPM).

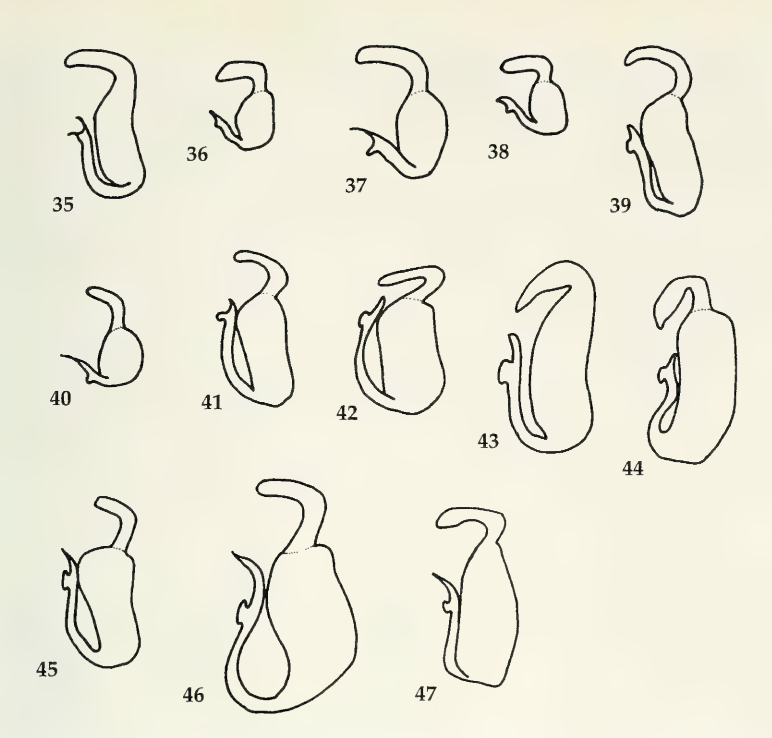
Description

Body elongate, comparatively narrow. Dorsal surface metallic green with weak bronze lustre. Apices of pro- and mesotibiae, first 4 antennal segments yellow, remaining parts of tibiae dark brown. All femora, metatibia and last 7 antennal segments black. Antennal calli narrow, with shiny surface. Frons flat or slightly concave and densely covered with comparatively large punctures and transverse wrinkles. Occiput covered with much more shallow but longer wrinkles. Longitudinal furrows of pronotum deep, transverse one shallow. Lateral sides straight in basal ⅓. Anterior angles comparatively small. Lateral margin narrow. Pronotal puncturation sparse and fine. Elytra parallel-sided. Striae regular on disk, but slightly mixed at apicies. Punctures small, diameter on one less than distance between rows. Surface of intervals shiny, with tiny, sparse punctures without wrinkles.
Length: 1.9-2.1 mm.

Distribution: Known only from the type locality on Sahalin and Kunashir.

Host plants: *Salix* sp.

Comments. This species is similar to *C. plutus*, but can be easily distinguished by the wrinkles of the frons, the leg color, the shape and punctures of pronotum and the shape of aedeagus and spermatheca.



Figs 35-47. Spermatheca of *Crepidodera*. 35. *C. aurea* Geoffr. 36. *C. obscuripes* Heik. 37. *C. fulvicornis* F. 38. *C. japonica* Baly. 39. *C. aurata* Marsh. 40. *C. nigricoxis* All. 41. C. *plutus* Latr. 42. *C. sahalinensis*, spec. nov. 43. *C. lamina* Bed. 44. *C. picipes* Wse. 45. *C. ussuriensis*, spec. nov. 46. *C. nitidula* L. 47. *C. wittmeri* Doguet.

Crepidodera lamina (Bedel), comb. nov.
Figs 1-7, 15, 26-29, 43, 56

Chalcoides lamina Bedel, 1901: 398; Heikertinger & Csiki 1939: 321; Heikertinger 1950: 113; Shapiro 1965: 452; Mohr 1966: 248; Gruev 1986: 275.

Material. Germany, Scheucherberg, 02.07.1973, Hebauer (USNM); Bohemia, Bichelov, Prochaska (USNM); Ukraine, Kodry, 18.07.1969 (ILPM); Russia, Krasnodar, 29.04.1979 (ZMAS); Kaluzhnaja st., 01.08.1981 (ZMAS); Nort West Caucasus, tuapse, 29.06.1982, A. Konstantinov (AKPM), (ZMBU); Georgia, Akhaldaba, 12.07.1983, A. Konstantinov (ZMBU).

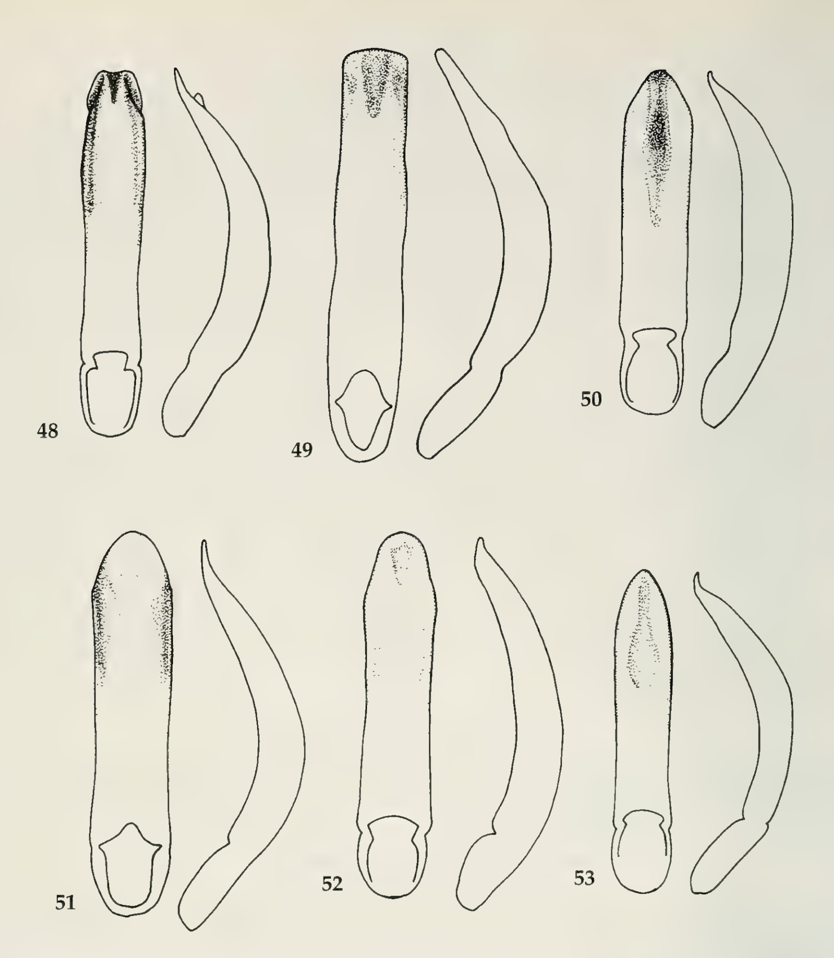
Redescription

Body wide, large. Dorsal surface metallic green, blue, golden or bronze. Antennae excluding last 3 segments, front and middle legs, metatibiae and tarsi yellow. Metafemora and last 3 antennal segments brown. Frons convex and shiny, densely covered with small punctures, without wrinkles. Pronotum with lateral sides straight in basl ⅓. Posterior setiferous pores situated on small toothlike processes. Transverse and longitudinal furrows shallow. Puncturation large and sparse. Elytra with regular rows of large punctures, larger than pronotal punctures. Distances between rows covered with more or less large punctures.

Length: 2.7-3.8 mm.

Distribution: Central and South Europe, Caucasus, Turkey.

Host plants: *Populus tremula, Salix* sp.



Figs 48-53. Male genitalia of *Crepidodera*, ventral and lateral view. 48. *C. aurea* Geoffr. 49. *C. obscuripes* Heik. 50. *C. fulvicornis* F. 51. *C. japonica* Baly. 52. *C. aurata* Marsh. 53. *C. nigricoxis* All.

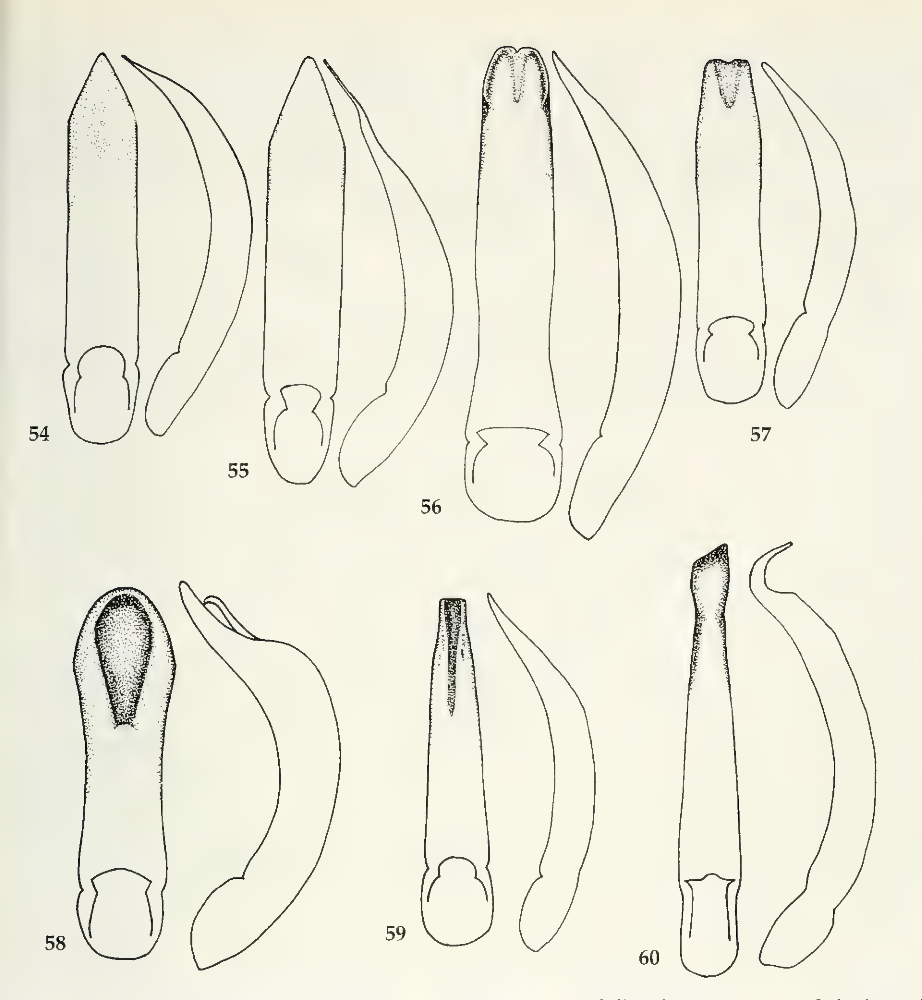
Crepidodera gemmata (Abeille), comb. nov.
Figs 16, 57

Chalcoides gemmata Abeille, 1895: 402; Heikertinger 1950: 113.

Material. Algeria, Bom., Amouche Setif, 20.04.1987, M. Bergeal (AKPM).

Redescription

Body small, elongate. Dorsal surface greenish bronze, cupreous or golden. Antennae excluding last 3 segments, legs yellow. Last 3 antennal segments slightly fuscous. Frons flat, covered with deep, transverse wrinkles and large punctures. Pronotum with lateral sides straight in basal $^1/_3$. Transverse and longitudinal furrows deep. Puncturation large and dense. Elytra with regular rows of punctures, only second row siuate apically. Elytral punctures larger then pronotal. Interstriae covered with small punctures.



Figs 54-60. Male genitalia of *Crepidodera*. 54. *C. plutus* Latr. 55. *C. sahalinensis*, spec. nov. 56. *C. lamina* Bed. 57. *C. gemmata* Abeil. 58. *C. picipes* Wse. 59. *C. ussuriensis*, spec. nov. 60. *C. nitidula* L.

Length: 2.0-2.7 mm.

Distribution: North Africa (Alger, Tunis).

Host plants: Unknown.

Crepidodera picipes (Weise)

Figs 17, 44, 58

Chalcoides picipes Weise, 1887: 192; Heikertinger 1950: 114.
Crepidodera picipes, Medvedev 1992: 586.
Crepidodera mroczkowskii Warchalowski, 1969: 230.

Material. Russian Far East: Habarovsk distr., Korfovskaja, 02.07.1982, O. Kabakov (ZMAS); Primorie, 23.06.1973, E. Matis (ILPM); Sahalin, pic Chehova, 14.08.1992, A. Konstantinov (AKPM).

Redescription

Body wide. Dorsal surface metallic-blue with faint green lustre. Antennae, with exception of segments 2 and 3, all femora and metatibiae black. Antennal segments 2 and 3, pro- and mesotibiae, all tarsi yellow. Frons with oval excavation from above to antennal calli. Bottom of excavation covered with transverse wrinkles and small punctures. Sides of pronotum slightly curved in basal ⅓. Transverse and longtitudinal furrows deep with sharp margins. Pronotal punctures comparatively small. Elytral striae regular. Intrervals wider than diameter of punctures.

Length: 2.5-3.2 mm.

Distribution: Russian Far East, Sahalin, Korea, China.

Host plants: *Salix* sp.

Comments. Gressitt & Kimoto (1963) apparently used this species name for *C. obscuripes* Heik. as shown by their drawing of the male genitalia (Gressitt & Kimoto 1963: Fig. 203b, p. 776). This may account for why A. Warchalowski (1969) described *C. picipes* again under the name *C. mroczkowskii*. The same opinion was expressed by L. Medvedev (1992).

Crepidodera ussuriensis, spec. nov.

Figs 18, 45, 59, 61

Types. Holotype: ♂, Russian Far East, Ussurijsk distr., Kamenushka, 23.08.1992, A. Konstantinov (USNM). - Paratypes: 2♂♂, 1♀, same data as holotype (1♂ ZMAS, rest in AKPM).

Description

Body narrow and elongate. Dorsal surface dark metallic blue, with slight green lustre. Antennae excluding segments 2 and 3, all legs except apices of tibia and tarsi, dark brown, apices of tibiae and tarsi and antennal segments 2 and 3 light brown. Fourth tarsal segments obscure. Frons with transverse furrow near antennal calli. Furrow margin near calli densely covered with punctures. Remainder of frons covered with small sparse punctures, shiny between punctures. Antennal calli much more rounded than calli of other species. Pronotum convex with lateral sides straight in basal ⅓. Anterior angles rounded. Puncturation comparatively coarse and dense. Transverse furrow shallow, longitudinal furrows deep with acute margin. Elytra not parallel-sided, maximum width at apical ⅓. Rows of punctures regular. Punctures large, their diameter greater than distance between rows. Intervals covered with tiny punctures and wrinkles.

Length: 2.2-2.6 mm.

Distribution: Known only from the type locality in the Far East.

Host plants: *Salix* sp.

Comments. This species is similar to *C. fulvicornis*, but it can be distinguished easily by the color of legs and antennae, shape of pronotum, and shape of aedeagus and spermatheca.

Crepidodera viridis Gressitt & Kimoto

Fig. 19

Crepidodera viridis, Gressitt & Kimoto, 1963: 775.

Material. Far East, Dichun, 14.06.1978, Konovalov (AKPM).

Redescription

Body wide. Color metallic green with pale golden lustre. Pronotum and head bronze. Antennae except segments 2, 3 and 4, middle of pro-, meso- and entire hind femur dark brown. Bases and tops of pro- and mesofemur, all tibiae and tarsi, antennal segments 2, 3 and 4 yellow. Frons prominent, dull with small wrinkles and punctures near antennal calli. Pronotum with lateral margin almost straight at

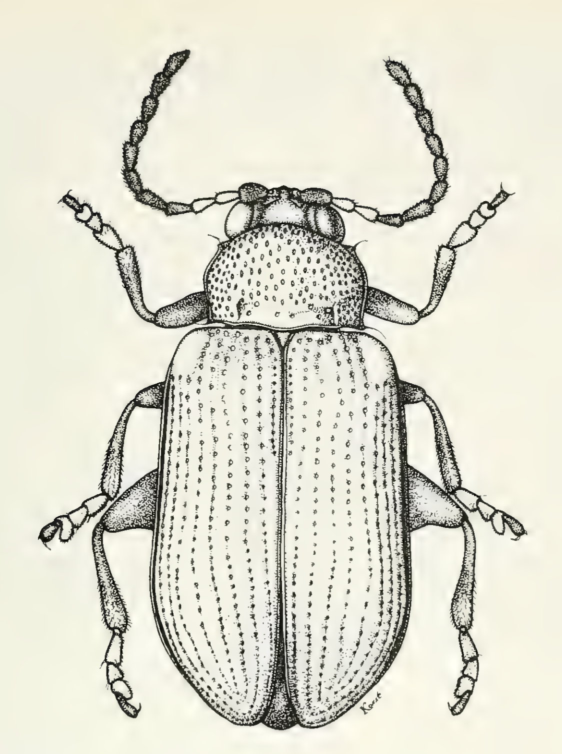


Fig. 61. *Crepidodera ussuriensis*, spec. nov., dorsal view.

basal ⅓. Anterior angles prominent, sharp. Transverse furrow shallow. Longitudinal ones deep. Puncturation dense and coarse. Elytra with regular rows of punctures. Size of punctures slightly larger than size of pronotal punctures. Distances between punctures greater than diameter of punctures. Each interval with 2 rows of small punctures.

Length: 4.1 mm.

Distribution: W. China, Russian Far East.

Host plants: *Salix* sp.

Crepidodera nitidula (Linnaeus), comb. nov.

Figs 20, 46, 60

Chrysomela nitidula, Linnaeus, 1758: 373.

Chalcoides nitidula, Heikertinger & Csiki 1939: 322; Heikertinger 1950: 109; Shapiro 1965: 452; Mohr 19656: 248; Gruev & Tomov 1986: 276.

Material. England, Ongar, 29.05.1949, D. F. Buck (USNM); Germany, Hildesheim, Rautenberg (USNM); Beylorussia, Mogilev distr., Orekhovka, 09.10.1978, M. Moroz (AKPM), Russia: Smolensk, 05., (ZMAS); Riasansk distr., 13.06.1915, (ZMAS); Iaroslavl distr., 05., 06., 08. 1928 (ZMAS).

Redescription

Body large, comparatively wide. Pronotum and head greenish or coppery bronze. Elytra metallic blue or violet. Metafemora and last 4 antennal segments brown. Front and middle legs metatibiae and tarsi, first 7 antennal segments yellow. Frons flat, dull, densely covered with large punctures. Trans-

verse and longitudinal furrows not deep, but with sharp margins. Punctural rows of elytra mixed at apices. Diameter of punctures larger than distances between rows. Intervals covered with small punctures and wrinkles.

Length: 2.9-3.7 mm.

Distribution: North and Middle Europe.

Host plants: *Populus tremula, P. alba, P. balsamifera, Salix cinerea.*

***Crepidodera wittmeri* (Doguet), comb nov.**
Figs 21, 47

Chalcoides wittmeri Doguet, 1976a: 92.

Material. Iran, Assalam, 1.300 m, 10.05.1970, Wittmer, coll. Paratype ♀ (SDPM); the same data as paratype, ♀ (NHBM).

Redescription

Body wide, oval. Metallic blue, pronotum with faint green lustre. Pro- and mesotibiae, and tarsi, first 5 antennal segments yellow. Pro- and mesofemur, metatibia brown, metafemur black. Antennal segment 6 light brown. Antennal calli with impression separating them from frons. Frons densely covered with wrinkles near antennal calli, remainder of frons with small punctures, shiny. Pronotum with lateral margins straight in basal ⅓. Transverse and longitudinal furrows deep. Punctural rows of elytra regular. Diameter of punctures almost equal to distances between rows. Intervals covered with small punctures and shallow wrinkles.

Length: 2.9-3.1 mm.

Distribution: Iran.

Host plants: Unknown.

Acknowledgements

I would like to thank Prof. I. K. Lopatin (Minsk) for his valuable and constructive suggestions. I also thank Prof. G. S. Medvedev (St. Petersburg), Dr. R. White (Washington), Dr. M. Brancucci (Basel), Dr. M. Moroz, S. Saluk and A. Tishechkin (Minsk), Dr. S. Doguet (Paris), Dr. M. Biondi (Rome) for the use of the collections or for providing material.

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Buchbesprechungen

1. Bitsch, J. & J. Leclercq: Hyménoptères Sphecidae d'Europe Occidentale. Vol. 1. Generalites-Crabroninae. - Faune de France, 79. Fédération Francaise des Sociétés des Sciences naturelles, Paris, 1993. 325 S., 59 Taf., 98 Verbreitungskarten. - ISBN 2-903052-13-1.

Diese Broschüre enthält einleitend eine Beschreibung der morphologischen Merkmale der Sphecidae, einen Bestimmungsschlüssel für die Familien der Aculeata, um die Stellung der Grabwespen in diesem System zu verdeutlichen, und anschließend eine Klassifikation der Spheciden. Ein interessanter Abschnitt dieses Kapitels befaßt sich mit der Phylogenie der Aculeaten. Der umfangreiche, systematische Teil beginnt mit einem modernen Schlüssel für die europäischen Sphecidae-Gattungen. In der darauf folgenden Abhandlung der einzelnen Subfamilien steht vorweg jeweils ein Bestimmungsschlüssel für die Arten. Auf die Systematik der einzelnen Spezies mit Aufführung aller bekannten Synonyme folgen detaillierte Beschreibungen, die von charakteristischen Zeichnungen begleitet werden. Angaben über Biologie und Verbreitung, letztere auf kleinen Karten Frankreichs wiedergegeben, und eine Liste der Bearbeiter, die über die betreffenden Arten publiziert haben, vervollständigen die einzelden Darstellungen. Abgeschlossen wird das Werk mit einer sehr umfangreichen Bibliographie.

Die Autoren haben sich viele Jahrzehnte lang mit den Grabwespen Frankreichs und der angrenzenden Länder beschäftigt. Daher dürfte die vorliegende Arbeit alle bis heute bekannten Fakten über diese Tiere enthalten.

E. Diller

2. Bolton, B.: Identification Guide to the Ant Genera of the World. - Harvard University Press, Cambridge, Massachusetts; London, 1994. 222 S., 522 REM-Aufnahmen. - ISBN 0-674-44280-6.

Mehrere Autoren haben in den letzten Jahren umfassend über Ameisen geschrieben und auch teilweise gute Bestimmungsschlüssel für deren Gattungen veröffentlicht. Bei den heute geschätzten 15000 Arten dieser Familie, von denen bisher etwa 10000 in 296 Gattungen weltweit beschrieben sind, ist die vorliegende globale Bearbeitung der Genera eine respektable Leistung. Unterstrichen wird sie noch dadurch, daß neben den im Bestimmungsschlüssel erfaßten Merkmalen zusätzlich REM-Aufnahmen die Charakteristika aller Gattungen prägnant herausheben. Bolton gibt für die derzeit bekannten 16 Unterfamilien einen Bestimmungsschlüssel und handelt dann diese Subfamilien detailliert mit einem Schlüssel für die Kaste der Arbeiterinnen, in zoogeographischen Regionen aufgeteilt, ab. In seiner Klassifikation werden zusätzlich die bekannten Synonyme angeführt sowie Verbreitung und frühere Bearbeiter genannt. Der Schwerpunkt seines exzellenten Werkes sind jedoch die qualitativ hervorragenden Rasterelektronenaufnahmen, die jeweils ein Genus in zwei für die Determination wichtigen Einstellungen zeigen. Jeder, der sich mit Ameisen ausführlicher beschäftigt hat, weiß, daß die Bestimmung der einzelnen Gattungen durch das weitgehende Fehlen von morphologischen Abbildungen bisher äußerst schwierig war. Dieser schwerwiegende Mangel wurde durch die vorliegende Monographie hervorragend behoben. Abgeschlossen wird die Arbeit mit einem "Glossary of Morphological Termes" und einer umfangreichen Bibliographie. Wer Formicidae bestimmen muß, kann auf dieses gut ausgestattete Buch nicht verzichten. Es erleichtert nicht nur die Arbeit, sondern ermöglicht auch eine exakte Determination und damit zuverlässige Aussagen. E. Diller

3. Drovenik, B. & H. Peks: Catalogus Faunae. Carabiden der Balkanländer. Coleoptera Carabidae. - Coleoptera, Schwanfelder Coleopterologische Mitteilungen, Sonderheft I, Schwanfeld 1994. 103 S. ISSN 0945-1889.

Länderkataloge der Laufkäferfauna Europas haben in den letzten beiden Jahren anscheinend Hochkonjunktur, denn nach den Katalogen für Italien (Vigna Taglianti 1993) und die Iberische Halbinsel (Zaballos & Jeanne 1994), sowie den unten besprochenen Katalogen für Bulgarien und Rußland, beide 1995, erschien im vorigen Jahr der Katalog der Laufkäfer des ehemaligen Jugoslawien. Das ist eine sehnlich erwartete Arbeit, denn die letzte katalogartige Zusammenstellung der Laufkäfer dieses Gebietes war die von Apfelbeck (1904)! B. Drovenik, der sich dieser Mühe unterzog, sei daher sehr dafür gedankt, eine Grundlage für die weitere Arbeit geschaffen zu haben.

Allerdings müssen bei diesem Katalog leider einige Einschränkungen gemacht werden. Die Arten werden in der systematischen Reihenfolge der Gattungen bzw. Untergattungen aufgeführt, innerhalb dieser aber alphabetisch geordnet. Dabei entspricht es nicht den Nomenklaturregeln, die Arten unter dem Namen der Untergattung zu zitieren. Vor allem fällt aber auf, daß die bereits seit einigen Jahren im Schrifttum benützte bereinigte Nomenklatur nicht verwendet wird. Verschiedene taxonomische Veränderungen der letzten Jahre sind ebenfalls nicht aufgenommen und leider sind auch durchgängig keine Synonyme aufgeführt. Als Verbreitungsangaben werden nur die abgekürzten ehemaligen Länder Jugoslawiens angegeben, nur in einigen Fällen, etwa bei endemischen Arten, findet sich auch eine nähere Ortsangabe. Die Angabe der Gesamtverbreitung der Art fehlt jedoch. Die Einleitung ist sehr sparsam gehalten und weder eine Checklist, ein Index, noch ein Literaturverzeichnis sind enthalten. Das letztere ist allerdings in Planung. Einige Druckfehler bei Artnamen fallen dagegen kaum ins Gewicht. Insgesamt besitzt daher dieser Katalog nicht die Qualität, die er, bei relativ geringer Mehrarbeit, hätte erreichen können. Da man beim Verlag offenbar bereits an eine Überarbeitung denkt, die diese Schwächen beheben soll, kann man in naher Zukunft auf eine solide, äußerst wertvolle Grundlage für die zukünftige Arbeit an der Laufkäferfauna der Balkanländer hoffen. M. Baehr

SPIXIANA	19	1	39–42	München, 01. März 1996	ISSN 0341-8391

Der Familienstatus von *Lypusa maurella* Denis und Schiffermüller, 1775

(Insecta, Lepidoptera)

von **Wolfgang Dierl**

Dierl, W. (1996): Family status of *Lypusa maurella* Denis und Schiffermüller, (1775). (Insecta, Lepidoptera). – Spixiana **19/1:** 39-42

The species *maurella* was described to be a *Tinea* (Tineidae). Many authors included this taxon into the family. Others considered it to be a Psychid moth due to its case bearing larva. Studies on the morphology of both sexes, especially on the genitalia structures indicate that *maurella* is neither a Tineid nor a Psychid moth. The construction method of the larval case is rather different from that of the Psychidae. The question to what family *maurella* belongs cannot be answered at the moment. The author adopts, rather provisional, the family Lypusidae Heinemann, 1870.

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Einleitung

Die Gattung und Art *Lypusa maurella* wurde bisher in mehreren Familien innerhalb der sogenannten Mikrolepidopteren (Tineiformes im alten Sinn) herumgeschoben. Einige Autoren (Eyer 1924, Mees 1910) stellen sie zur Familie Tineidae nach heutiger Auffassung. Andere (Tutt 1900, Dalla Torre & Strand 1929, Petersen 1964) verbinden sie mit der Psychidae, wohl auf dem Larvalgehäuse basierend. Schließlich stellt sie Heinemann (1870) in eine eigene Familie. Faktum ist jedoch, daß die Kenntnisse der Merkmale dieser Art sehr spärlich sind. Wir kennen die klassische Imaginalmorphologie (vgl. Mees in Spuler 1910), Geäder, Fühler usw., den ♂ Genitalapparat (Eyer 1924) und den Gehäusebau. Angaben zur ♀ Genitalmorphologie sowie zur Larvalmorphologie (vgl. Chaetotaxie) gibt es nirgends in der entsprechenden Literatur. So wird auch die Biologie sehr kurz und nicht eingehend beschrieben. Damit ist es aus den vorhandenen Merkmalskenntnissen nicht möglich, die Art einer Familie zuzuordnen.

Aus eigenen Untersuchungen an ♂ und ♀ Imagines wird nun versucht, die Kenntnis über diese Art zu erweitern und damit aber auch Anstöße zu weiteren Feststellungen zu geben. Durch Vergleich mit der Morphologie einschließlich Genitalmorphologie beider Geschlechter sowie der Konstruktionsmethode des Gehäusebaus ist eine nähere Verwandtschaft mit den Psychidae auszuschließen. Ebensowenig konnten Beziehungen zu irgendeiner der dem Autor bekannten Tineidae-Gattungen und -Arten gefunden werden. Damit bleibt die Familienzugehörigkeit zunächst völlig offen. Die Gattung *Lypusa* mit ihrer Art *maurella* wird deshalb, wenn auch provisorisch, der Familie Lypusidae Heinemann, 1870 zugeordnet.

Untersuchtes Material

Aus der Zoologischen Staatssammlung konnten 21 Exemplare untersucht werden, die aus folgenden Gebieten stammen: Harz, Regensburg, Bayerischer Wald, Linz/Donau, Kaiserslautern, Karlsruhe,

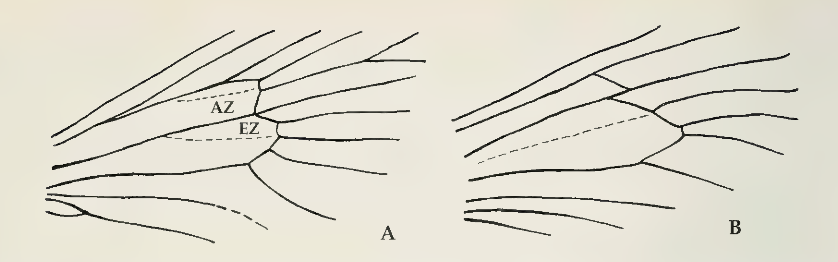


Abb. 1. *Lypusa maurella*. A. Schema des Vorderflügelgeäders. B. Schema des Hinterflügelgeäders. EZ: Eingeschobene Zelle, AZ: Anhangzelle.

Pfalz, Schweiz, Kärnten, einschließlich eines Gehäuses aus dem Bayerischen Wald. Die Flugzeit der Tiere liegt in V und VI. Nach Heimenann (1870) findet man die Art in Wäldern und Mooren um Heidekraut, Sackträger wird angegeben, aber sonst keine biologische Daten.

Nomenklatorische Übersicht

maurella Denis & Schiffermüller, 1775, p. 142 (als *Tinea*).

Lypusa Zeller, 1852, p. 331. *Maurella* als Monotypus für die Gattung.

Lypusidae Heinemann, 1870, p. 28. Typusmaterial der Familie: *Lypusa*. Weitere Behandlung des Themas findet man bei Tutt (1900), Mees in Spuler (1910), Dalla Torre & Strand (1929), Eyer (1924) und Petersen (1964). Alle anderen Autoren basieren auf nicht eigenen Untersuchungen.

Merkmalsübersicht

Ein gutes Bild des Habitus, farbig, aber halbseitig, gibt Mees in Spuler (1910, III, Taf. 91 Fig. 37 sowie p 455 II, Geäder). ♂ und ♀ kaum verschieden, ♀ etwas größer, Spw. 13-16 mm. Dunkelbraun, mit schwachem grün-bläulichem Glanz, schmalflügelig. Kopf an der Stirn anliegend mit breiten Schuppen bedeckt, nicht borstenförmig abstehend wie bei den meisten Tineiden. Palpen sehr kurz, den Tineiformes entsprechend, Nebenpalpen rudimentär wie der Rüssel, der nur noch zwei Höcker aufweist. Augen mit Abstand 2 (Dierl 1970), was auf Tagflieger schließen läßt (kleine Augen!). Die geringen Sammelergebnisse könnten das bestätigen, da es sich wohl um keine Lichtfangergebnisse handelt, wie bei diesen "Mikrogruppen" sonst üblich. Ozellen fehlen. Fühler einfach, von ⅔ Vorderflügellänge. Bei den ♂ mit Schuppenbüscheln auf der Dorsalseite jedes Gliedes und Borsten von etwa Durchmesserlänge der Fühlerglieder auf der Ventralseite. Die Fühler der ♀ rundum gleichmäßig beschuppt, nicht büschelig. Die Borsten viel kürzer als der Durchmesser. Bei beiden die zwei Grundglieder der Fühler mit struppigen Schuppenbüscheln. Das Geäder (Abb. 1 A, B) entspricht dem sehr ursprünglichen System der Tineiformes: 12 Adern im Vorderflügel, 7+8 gestielt auf ½, alle anderen Adern frei, in der Mittelzelle eine gegabelte Media angedeutet (EZ) ebenso wie eine Anhangzelle (AZ). Im Hinterflügel ist das Geäder vollständig, die Media in der Zelle einfach. Die Flügel sind mit breiten, nicht haarförmigen Schuppen bedeckt. An der Vordertibia eine Apophyse mit ⅓, ein Spornpaar an den Mittelbeinen und zwei an den Hinterbeinen. Es wesentliches Merkmal bildet die Genitalmorphologie beider Geschlechter. Der ♂ Genitalapparat wurde mehrfach abgebildet, aber nicht näher beschrieben (Abb. 2). Es wurden auch keine Vergleiche mit anderen Gruppen vorgenommen. Das Tegumen ist caudal abgerundet mit einem gerade abgeschnittenen proximalen Dachabschnitt und einem u-förmigen Uncus, dessen Enden gabelförmig zugespitzt sind. Das Vinculum besteht aus einer u-förmigen Spange ohne Saccus. In der Membran findet sich eine unregelmäßig trapezförmige Platte mit gebogenen Rändern als Juxta. Am Gelenk zwischen Tegumen und Vinculum findet sich ein schmaler, fingerförmiger, gelenkiger und borstenbesetzter Fortsatz, den man als Peniculus bezeichnen kann. Die Valven haben leicht gekrümmte, parallele Seiten und ein abgerundetes Ende, an dem stärkere, gekrümmte

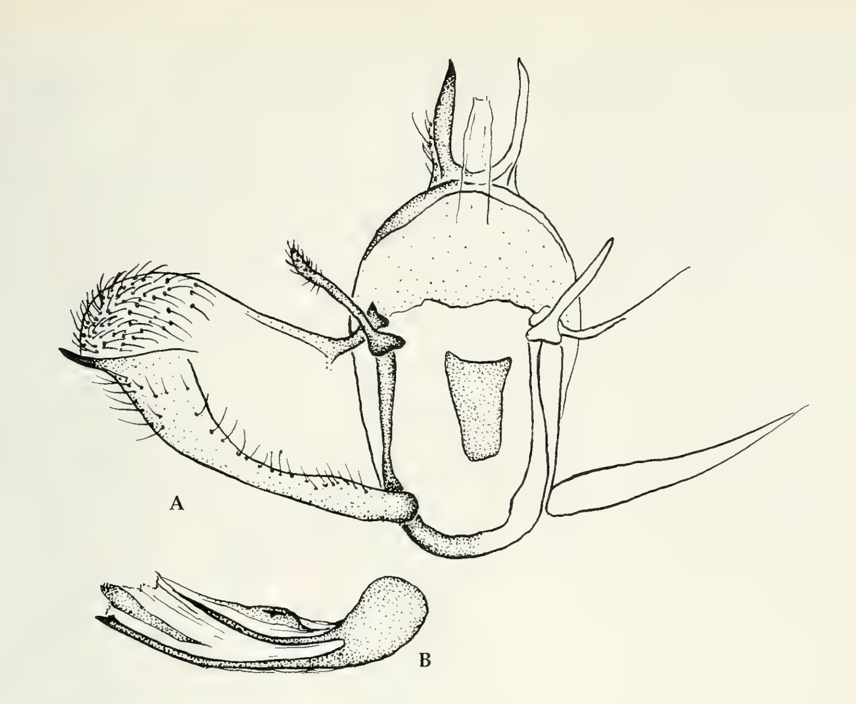


Abb. 2. A. ♂ Genitale. B. Penis. Abbildungsmaßstab 40:1.

Borsten zu finden sind. Dort sitzt auch ein kurzer, spitzer Clasper. Der Penis ist leicht gekrümmt und weist dorsal und ventral eine verdickte Leiste auf ausgehend von der Basis. Distal findet sich eine schmale, proximal zugespitzte Platte, die als Cornutus anzusehen ist. Ebenso eine kurze Verdickung auf der Ventralseite mit einem nagelförmigen Sklerit darin. Es ist schwer, etwas Vergleichbares zu finden, am ehesten bei den Plutellidae. Die Frage der Homologien ist aber völlig offen.

Der ♀ Genitalapparat (Abb. 3) besteht in seinen ektodermalen Teilen aus einem kurzen Ovipositor mit zwei Paaren von Apophysen, von denen die hinteren aus schmalen, langen Stäben bestehen, die beiden vorderen nur halb so lang, mit seitlichen Fortsätzen nahe der Mitte. Tergit und Sternit des 8. Segments bestehen aus einfachen, sklerotisierten Platten. Vom einfachen Ostium bursae führt der Ductus bursae über ein sklerotisiertes Antrum in den Corpus bursae, dessen Hälfte granuliert ist, während die andere ein etwa trapezförmiges Signum enthält, das an den Rändern kleine Dornen trägt. Vestibulum granuliert, Ductus receptaculi, Receptaculum seminis und die lange Gladula receptaculi im Präparat kollabiert. Hervorzuheben sind die beiden mächtigen Schenkel der Glandula sebacaea.

Das Gehäuse von *Lypusa maurella*

Ein Blattstück wird schwach konisch eingerollt, so daß an einer Seite eine Naht zu finden ist. Die Rolle ist 10 mm lang, am Vorderende 2.5 mm weit, am Hinterende 1.5 mm. Wieweit das Blattstück aus der Nahrungspflanze herausgeschnitten ist, müßte geprüft werden. Die Nahrungspflanze ist nach gegenwärtiger Kenntnis nicht bekannt, ebenso nicht die Größenveränderung während des Larvenwachstums. Es ist denkbar, daß das vorliegende Gehäuse ein Puppenkokon ist und die Raupe andere Gehäuse, wenn überhaupt, baut. Die Larve ist unbekannt und zur Biologie gibt es nur die Angabe "bei Heidekraut in Wäldern und Mooren".

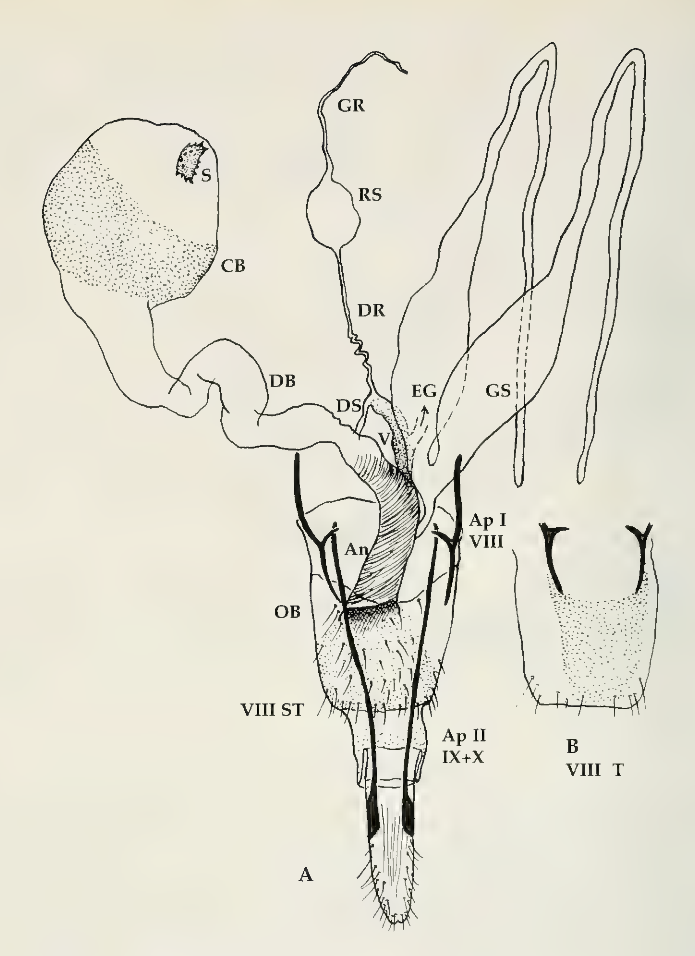


Abb. 3. *Lypusa maurella.* A. ♀ Genitalstrukturen, Ventralansicht. B. 8. Segment, Dorsalseite. An: Antrum, ApI und ApII: 1. und 2. Apophysen, CB: Corpus bursae, DB: Ductus bursae, DR: Ductus receptacula, DS: Ductus seminalis, EG: Eiergang (zu den Ovarien), GR: Glandula receptaculi, GS: Glandula sebacaea, OB: Ostium bursae, RS: Receptaculum seminis, ST: Sternit, T: Tergit. Römische Zahlen: Segmentnummern, Abbildungsmaßstab 35:1.

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Chironomidae from Ethiopia, Part 3. Chironomini, with description of a new species

(Insecta, Diptera)

By **A. D. Harrison**

Harrison, A. D. (1996): Chironomidae from Ethiopia, Part 3. Chironomini, with description of a new species (Insecta, Diptera). – Spixiana **19/1:** 43-87

Males, females, pupae and larvae of Chironomini found in the Ethiopian Highlands and Rift Valley are described. Not all stages were available for all species. One new species is described: *Polypedilum (Polypedilum) tesfayi*, spec. nov.

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Introduction

This paper is the third in the series on Chironomidae collected in Ethiopia; the two previous papers were on the Tanypodinae (Harrison 1991), and the Orthocladiinae (Harrison 1992). Freeman & Cranston (1980) list Chironomini of Sub-Saharan Africa; most of the males of these are illustrated by Freeman (1957, 1958) and by Lehmann (1979, 1981), who also describes some females, larvae and pupae.

In this paper detailed descriptions are given of males of known species, and also of females, pupae and larvae when available. One new species is described. *Dicrotendipes septemmaculatus* and *D. pilosimanus* were also collected but are not dealt with here; they are given special treatment in Harrison (1993).

Specimens were collected by the author and colleagues from the Biology Department, Addis Abba University. The ecological background is given in Harrison & Hynes (1988), Tudorancea & Harrison (1988), Tilahun Kibret & Harrison (1989), Tudorancea, Baxter & Fernando (1989) and Tesfaye Berhe, Harrison & Hynes (1989).

Methods

Adults were collected by sweeping with a net in marginal vegetation along river banks and lake-shores; many were caught at lights. Running water species were bred out in an aquarium in the laboratory at Addis Ababa. Larvae and pupae were collected during lake and river survey programmes.

Specimens were mounted in Canada balsam dissolved in cellosolve; measurements were made with an eyepiece micrometer, and all drawings with a drawing tube on the microscope.

Generic definitions of males follow the model of Cranston, Dillon, Pinder & Reiss (1989), of females the model of Saether (1977), of pupae the model of Pinder & Reiss (1986) and of larvae the model of Pinder & Reiss (1983). Langton (1984) was also used for the pupal studies. Morphological terminolgy is from Saether (1980).

Station numbers (ET) given for river sites in the text are those of Harrison & Hynes (1989) who give descriptions and map references.

The type and paratype of the new species are deposited in the Zoologische Staatssammlung, Munich, Germany. Most of the other specimens have been deposited in the same museum.

Chironomus alluaudi Kieffer

Chironomus alluaudi, Freeman 1957

All three stages of the Ethiopian material were associated by breeding out material in Addis Ababa. Freeman separated *alluaudi* from other similar species by means of the large dark spots on abdominal segments 1-5 and the anal point that appears almost straight in side view.

Adult male (N = 2 mounted and many unmounted). Freeman's description is augmented as follows: Wing length 4.0-6.0 mm.

Head. AR 3.0-3.1. Frontal tubercles about as long as wide. Palp segments: 130, 130, 221, 260, 364 µm, 4 subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals about 20 biserial, posterior prealars 9 uniserial, scutellars 6 per side.

Wing. Setation: R 20, R_1 14, R_{4+5} nil.

Leg. LR fore 1.95, mid 1.8, hind 1.4-1.5. Sensilla chaetica on tarsomere 1: midleg 10, hindleg 11. Tarsomeres 2 & 3 of foreleg with beard.

Abdomen. Large brown spots on tergites 1-5.

Hypopygium. As described by Freeman, and with strong tergite bands, not meeting anterior to the 10 median tergite setae. About 18 anal tergite setae per side. Dorsal edge of anal point almost straight in lateral view. Base of superior volsella small with setae and sparse small microtrichia (Fig. 1); digitiform apex broadest in middle. Inferior volsella with about 36 strong, curved setae.

Adult female (N = 2 mounted). Wing length 5.6 mm.

Head. AR 0.4. Apical flagellomere 0.9× length of 3 and 4 together. Frontal tubercles twice as long as wide.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals about 20 biserial, posterior prealars 6 uniserial, scutellars 7 per side.

Wing. Setation: R 22, R_1 35, R_{4+5} 36.

Leg. LR fore 0.8, mid 0.5, hind 0.65. Sensilla chaetica on tarsomere 1: mid about 125, hind about 115.

Abdomen. Large brown spots on tergites 1-5.

Genitalia (Figs 2-4). Chitinized setigerous ventral ridge on tergite VIII anterior to dorsomesal lobe of gonocoxite VIII. Gonocoxapodeme VIII rounded caudally and not joined mesally. Gonopophysis VIII divided into a large, tongue-shaped dorsomesal lobe and brushlike ventrolateral lobe; apodeme lobe small with microtrichia. Coxosternapodeme large, dark and curved anteriorly (Fig. 3, left). Gonocoxite IX with about 15 setae. X with about 12 setae per side. Postgenital plate (not in figure) well-developed and rounded at apex. Labia without microtrichia. Seminal capsules oval, 143 µm long, spermathecal ducts with common opening.

Pupa (N = 2 mounted). Cephalothorax. Granulose with small scutal tubercles, 2 very small precorneals, 2 very small antepronotals, 4 inconspicuous dorsocentrals in pairs close together.

Abdomen. Tergite I without shagreen, II-VI largely covered with shagreen of fairly uniform appearance, anterior points about 6 µm, central points 15-19 µm and posterior points 24-31 µm; VII with 2 anterior patches of small points; VIII with 2 posterior patches of small points; conjunctives IV/V, V/VI and VI/VII with very fine shagreen. Hook row on II 0.73-0.85 width of tergite. Pedes spuri B on segment II and small pedes spurii A on IV. Posterolateral spur of VIII broad and somewhat curved (Fig. 5). Segment I without L setae, II-IV each with 3, V-VII with 4 lamelliform L setae. VIII with 5 lamelliform L setae. Anal lobe with fringe of about 105 setae.

Larva (N = 7 mounted). Head capsule length about 845 µm.

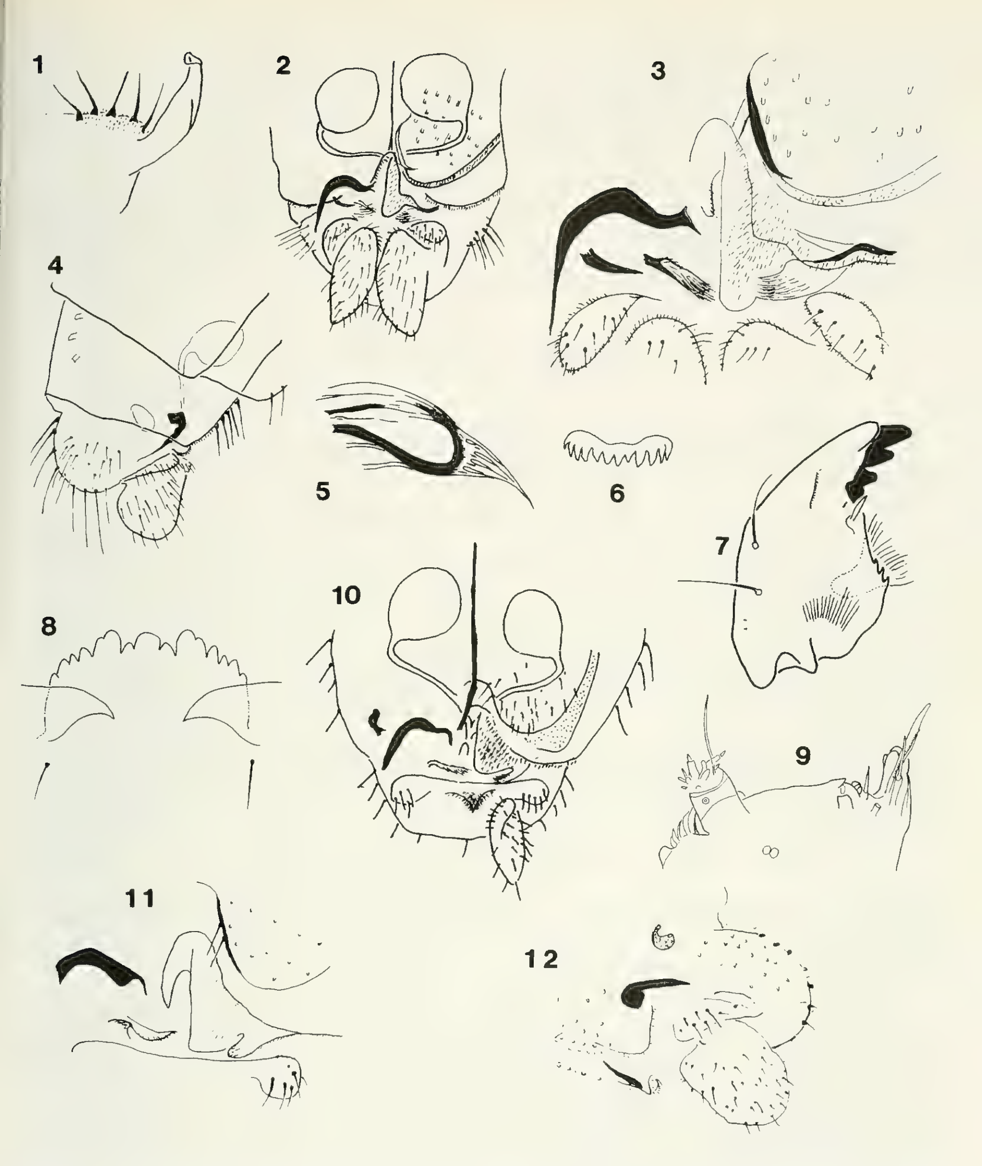
Antenna. Similar to generic definition.

Labrum. Similar to definition; S I plumose on both sides with lateral feathering extending about the distal one third. Pecten epipharynx (Fig. 6) with 12 teeth of irregular length. Premandible with 2 teeth.

Mandible (Fig. 7). Dorsal tooth pale, the rest dark, seta subdentalis simple and pointed, radially arranged grooves on outer surface.

Mentum (Fig. 8). In all specimens teeth were worn and rounded but arrangement is typical for genus. Ventrolateral plates are 0.95× width of mentum and separated by about one third width of mentum.

Maxilla (Fig. 9). Similar in general appearance to that illustrated by Cranston & Rice (1983) for the



Figs 1-9. *Chironomus alluaudi*. Adult: 1. Superior volsella. 2. ♀ genitalia, ventral. 3. ♀ genitalia, ventral. 4. ♀ genitalia, lateral. Pupa: 5. Abdomen, posterolateral spur. Larva: 6. Labrum, pecten epipharynx. 7. Mandible. 8. Mentum. 9. Maxilla.
Figs 10-12. *Chironomus caliptertus*. Adult: 10 ♀ genitalia, ventral. 11. ♀ Dorsomesal and apodeme lobes. 12. ♀ genitalia, lateral.

Orthocladiinae. Chaetulae of palpiger about one third the length of palp, a-seta of palp long and thin, b-seta and bisensillum absent, seta maxillaris 1+2, no pecten galearis, sensilla basiconicum thin and pointed, multilabate sensillum with broad lobes, lacinal chaetae near tip broadly rounded, one at least 2× length of others, one narrow and finely pectinate. Paraxial seta small, antaxial seta with base more than one third length of seta, ring organ on raised base, appendix seta simple.

Body. Similar to definition, lateral tubules and 2 pairs of ventral tubules, anal tubules short and rounded.

Specimens examined. Adults: Numerous ♂♂ and ♀♀, at lights, Addis Ababa, October & November 1982; numerous ♂♂ and ♀♀ bred from larvae collected in polluted Kebena River below ET.2C, Addis Ababa, March & April 1985; 1♂, Kosso River, ET.17, 84/1/12; 1♂, pond near Dinsho, Bale Mountains, 84/10/20. Pupae: Two, Kebena River below ET2C, Addis Ababa 1985. Larvae: Numerous, polluted Kebena River, below ET.2C, Addis Ababa 1985.

Ecology. Common to abundant in the polluted Kebena River flowing through Addis Ababa (Tesfaye Berhe et al. 1989), not found in unpolluted rivers or lakes in Ethiopian Highlands. Normal habitat appears to be ponds or small standing water.

Distribution. Kenya (Freeman 1957) and Ethiopian Highlands.

Chironomus calipterus Kieffer

Chironomus calipterus, Freeman 1957; Dejoux 1970b; Cranston & Judd 1989.

Dejoux associated all three stages and described the pupa and larva in detail. Freeman, and Cranston & Judd illustrate the male wing and the hypopygium.

Adult male (N = 2 mounted). Previous descriptions are augmented as follows:

Wing length 3 mm.

Head. AR 2.8. Frontal tubercles about 3× as long as broad. Palp segments: 37, 37, 155, 155, 233 µm. 3 subapical sensilla on segment 3.

Thorax. Small scutal tubercle present. Setation: Lateral antepronotals 5, dorsocentrals 17 partly biserial, posterior prealars 4, scutellars 7 per side.

Wing. With clouds as illustrated by Freeman, spots over cross vein and in cells (Cranston & Judd), visible in mounts, result from refraction by microtrichia. Setation: R 38, R_1 25, R_{4+5} 32, squama 21.

Leg. LR fore 1.7, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 7, hindleg 8. No beard on foreleg.

Hypopygium. As described by Freeman, Dejoux, and Cranston & Judd. Base of superior volsella small, with setae and long microtrichia up to base of curved digitiform appendix. Inferior volsella with about 15 strong curved setae.

Adult female (N = 4 mounted). Wing length 3 mm.

Head. AR 0.3-0.4. Frontal tubercles about 3× as long as broad. Palp segments: 47, 43, 146, 167, 267 µm.

Thorax. Small scutal tubercle. Setation: Lateral antepronotals 4, dorsocentrals 30 partly biserial, posterior prealars 4, scutellars 6 per side.

Wing. Similar to male. Setation: R 42, R_1 34, R_{4+5} 53, squama 9. Leg. LR fore 1.7-1.8, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: mid 46, hind 56.

Genitalia (Figs 10-12). Chitinized ventral ridge of VIII weak, well anterior to dorsomesal lobe of gonopophysis. Dorsomesal lobe large, microtrichia not extending to edge (Fig. 11, right). Ventrolateral lobe (Fig. 11, right) with short microtrichia. Apodeme lobe (Fig. 11, left) with weakly chitinized base and with microtrichia. Gonocoxapodemes broad and do not join. Coxosternapodeme dark, curved. Gonocoxite IX reduced to small, chitinized ridge with no setae (Fig. 12). Segment X with 8 setae per side. Post genital plate (Fig. 10) pointed. Labia without microtrichia. Seminal capsules almost oval, 109 µm long, ducts with common opening.

Pupa. None found. Dejoux's illustrations show a pupa rather typical for the genus with dorsocentrals easily visible. There are no posterolateral patches of spines on any of the tergites and the posterolateral spur of VIII is fairly broad, dark and bent with about 4 points.

Larva. None found. Dejoux's illustrations show a larva fairly typical for the genus. Premandible has 2 teeth and brush. Pecten epipharynx has 22 irregular teeth. Mentum has typical trifid central tooth. Anal tubercles short.

Specimens examined. Numerous ♂♂ and ♀♀ at lights, Lake Awasa, 81/4/15.

Comments. This species superficially resembles *C. formosipennis* because of the marked wings, but does not share its peculiarities, such as the shape of the male superior volsella, sensilla chaetica on female tarsomeres 2 and 3, and the simple central tooth of the larval mentum. In these and other respects it is more typical of the genus.

Ecology. Though adults were found on one occasion at lights at Lake Awasa no larvae or pupae were found during the extensive sampling of the lake (Tilahun Kibret & Harrison 1989). The larvae must have been living in shallow pools or swampy regions not part of the main lake.

Distribution. Afrotropical region, circum-Mediterranean and Arabian Peninsula.

Chironomus formosipennis Kieffer

Chironomus formosipennis, Freeman 1957; Dejoux 1970b.

Dejoux (1970b) associated all three stages and his association was confirmed by the Ethiopian material. Freeman (1957) and Dejoux describe the hypopygium, and Dejoux describes the pupa and larva in detail.

Adult male (N = 2 mounted). Freeman's description is augmented as follows:
Wing length 4.3-4.4 mm.
Head. AR 3.7. Frontal tubercles on a short stalk, about 2× as long as broad. Palp segments: 62, 78, 202, 186, 280 µm, 4 subapical sensilla on segment 3.
Thorax. Scutal tubercle present. Setation: Lateral antepronotals nil, dorsocentrals about 40 bi- or triserial, posterior prealars 8 uniserial, scutellars about 20 per side biserial.
Wing. With clouds as illustrated by Freeman; spot over cross vein and spots in cells are also visible in mounts and result from refraction by microtrichia. Setation: R 52, R_1 35, R_{4+5} 44, squama 18.
Leg. LR fore 1.3, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 15, hindleg 10. Tarsomeres 1 & 2 of foreleg with beard.
Hypopygium. As described by Freeman and Dejoux, with base of superior volsella larger than usual for the genus (Fig. 13), ventral part with small setae almost obscured by dense long microtrichia, and digitiform apex broad and curved. Inferior volsella with about 45 strong curved setae. In addition, tergal bands meet anterior to, and demarcate, the anterior edge of oval area with median anal tergite setae.

Adult female (N = 3 mounted). Wing length 4.8 mm.
Head. AR 0.5. Frontal tubercles about 2× as long as wide, on short stalk. Palp segments: 78, 91, 169, 208, 273 µm. Four subapical sensilla on segment 3.
Thorax. Scutal tubercle present. Setation: Lateral antepronotals nil, dorsocentrals about 36 bi- and triserial, posterior prealars 7 uniserial, scutellars about 30 per side biserial.
Wing. Setation R 42, R_1 30, R_{4+5} 54.
Leg. LR fore missing on all specimens, mid 0.58, hind 0.68. Sensilla chaetica: On tarsomere 1: midleg 64, hindleg 84; On tarsomere 2: midleg 18, hindleg 21; On tarsomere 3: midleg 9, hindleg 11.
Genitalia (Figs 14-16). Strongly chitinized setigerous ventral ridge of VIII opposite dorsomesal lobe of gonopophysis (Fig. 15), posteroventral edge of tergite VIII partly covering setigerous portion of segment X. Dorsomesal lobe of gonopophysis VIII large, microtrichia not extending to edge. Ventrolateral lobe (Fig. 15, right) narrow with small microtrichia. Apodeme lobe (Fig. 15, left) with base strongly chitinized, with long microtrichia. Gonocoxapodeme narrow and not joined. Coxosternapodeme almost black, curved. Gonocoxite IX small, visible in lateral view only (Fig. 16), three setae. Segment X with about 15 setae per side. Postgenital plate (Fig. 14) pointed. Labia without microtrichia. Seminal capsules almost spherical, 133 µm diameter, spermathecal ducts with common opening.

Pupa (N = 4 mounted). As described by Dejoux, and as follows:
Cephalothorax. Granulose with small scutal tubercles. Three very small precorneals, 2 minute antepronotals, 4 dorsocentrals, one of each pair large and dark, the other very small.
Abdomen. Shagreen on tergites, as for genus. Length of spines: anterior about 6 µm grading to posterior 37 µm; hook row almost full width of tergite II; pedes spuri B on II, and A on sternite IV with

large transparent hooks. Postero-lateral patches of spines on tergites V-VII. Conjunctives IV/V and V/VI with fine shagreen. Posterolateral spur of VIII broad and dark with 4 points. Segment I with 1 L seta, II and III with 3 and IV with 4, V-VII with 4 lamelliform L setae and VIII with 5. Anal lobe with frings of about 110 setae.

Larva (N = 3 mounted). As described by Dejoux and as follows:
Head capsule length 845-900 µm.
Antenna. Typical for genus.
Labrum. S I appears pectinate with about 20 teeth on one side only, other S setae as for genus. Pecten epipharynx with about 16 teeth, premandible with 3 teeth and brush.
Mandible. Dorsal tooth pale, 3 other teeth dark, seta subdentalis simple, radially arranged grooves basally on outer surface.
Mentum. Central tooth simple, the two smaller outer toothlets which make the central tooth of other species appear trifid are here attached to the first lateral teeth, making each of them appear trifid.
Maxilla. Similar to *C. alluaudi.*
Body, Similar to generic definition, with lateral tubules and 2 pairs of ventral tubules; anal tubules as long as, or longer than the prolegs.

Specimens examined. Adults: Numerous ♂♂ and ♀♀, at lights, Lake Ziway, 82/12/31. Larvae and pupae: One with pharate ♂, Bulbulla Shet, ET.34, flowing out of L. Ziway, 84/2/24.

Comments. This species has a number of distinctive features. The superior volsella of the male resembles that of the subgenus *Lobochironomus* (Cranston et al.). The female has sensilla chaetica on tarsomeres 2 and 3 in addition to those on tarsomere 1, on mid and hind legs; and gonocoxite IX is very small. The pupa has posterolateral patches of spines on tergites V-VII. The larva has a pectinate S I with teeth on one side only, and a mentum with a simple central tooth and trifid first lateral teeth. It is premature to allocate this species to any subgenus until much more is known about all life stages of the genus.

Ecology. Larvae were not found in Lake Ziway (Tudorancea et al. 1989), but in the slow-flowing Bulbulla Shet. Those adults captured at lights appeared to come from a shallow pool behind the reed beds of the lake, not the main lake. Dejoux found them in L. Chad (Dejoux 1970b, 1983).

Distribution. Most of Africa south of the Sahara.

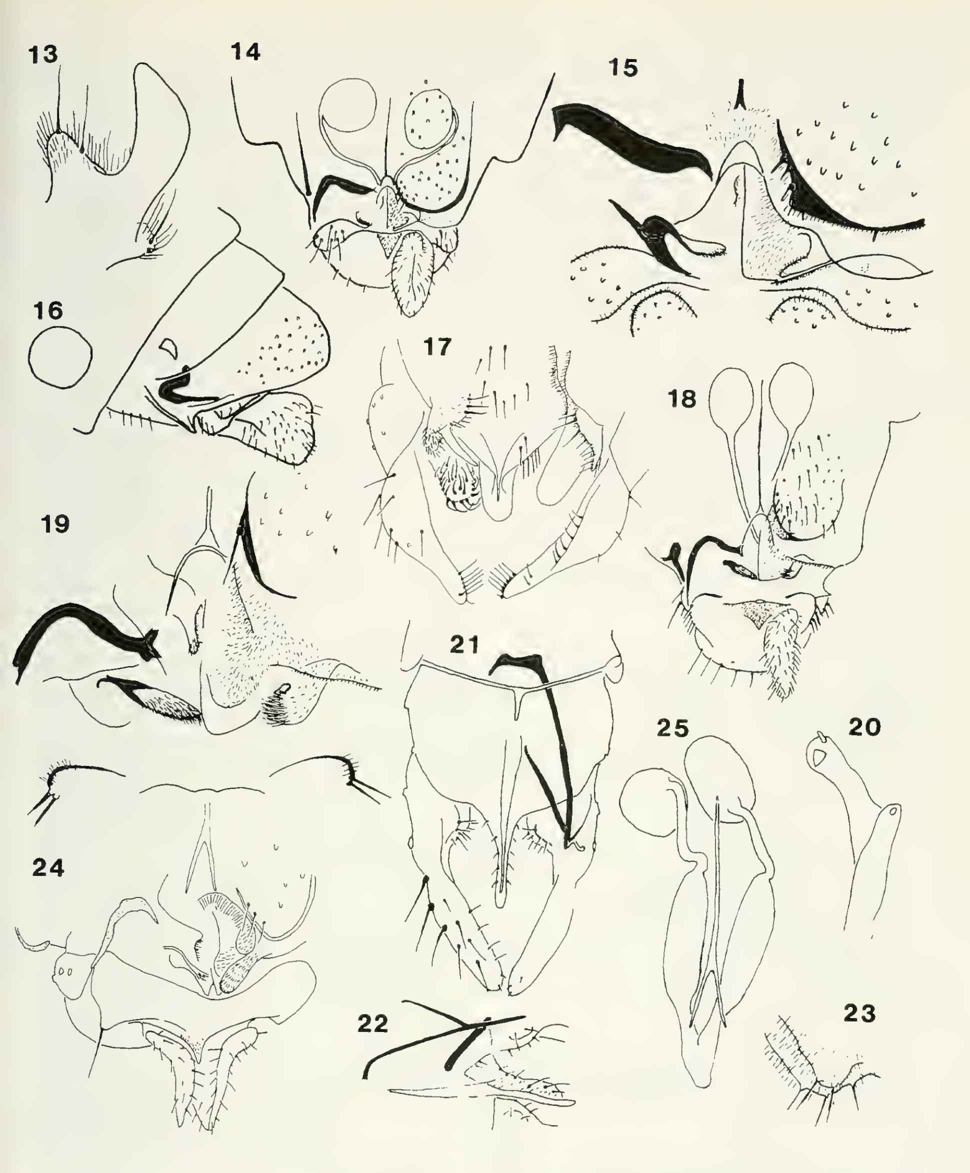
Chironomus imicola Kieffer

Chironomus imicola, Freeman 1957; Freeman & Cranston 1980.

Freeman describes the male and its hypopygium and gives a short description of the female. Further details of the male and female are given here. Unfortunately the pupa and larva were not found.

Adult male (N = 2 mounted). Close to generic definition except for details given here.
Wing length 4.8 mm.
Head. AR 3.4. Frontal tubercles nearly 3× as long as broad. Palp segments: 91, 78, 260, 260, 403 µm. 7 subapical sensilla on segment 3.
Thorax. Small scutal tubercle present. Setation: Lateral antepronotals 5, dorsocentrals 31 biserial, posterior prealars 8, scutellars 10 per side partly biserial.
Wing. Setation: Brachiolum 3, R 53, R_1 35, R_{4+5} 45, squama 57 bi- or multiserial.
Leg. LR fore 1.7. mid 0.6-0.7, hind 0.6-0.8. Sensilla chaetica on tarsomere 1: midleg 5-8, hind leg 5-13. No beard on foreleg.
Hypopygium (Fig. 17). Strong anal tergite bands (not in figure) meeting to delineate anterior margin of roughly oval area with about 15 median anal tergite setae. About 12 apical anal setae per side. Anal point strongly down turned. Superior volsella broad, strongly setose, digitform apex arising dorsomedialy. Inferior volsella with about 30 strong, curved setae.

Adult female (N = 1 mounted). Wing length 4.8 mm.
Head. AR 0.4. Frontal tubercles as for male. Palp segments: 65, 91, 273, 286, 442 µm. 7 subterminal sensory setae on segment 3.



Figs 13-16. *Chironomus formosipennis*. Adult: 13. Superior volsella. 14. ♀ genitalia, ventral. 15. Apodeme and ventrolateral lobes. 16. ♀ genitalia, lateral.
Figs 17-19. *Chironomus imicola*. Adult: 17. Hypopygium. 18. ♀ genitalia, ventral. 19. ♀ genitalia, apodeme and ventrolateral lobes.
Figs 20-25. *Harnischia curtilamellata*. Adult ♂: 20. Tentorium, 21. Hypopygium, 22. Anal point, lateral. 23. Superior volsella. Adult ♀: 24. Genitalia, ventral. 25. Seminal vesicles, ducts.

Thorax. Small scutal tubercle. Setation: Lateral antepronotals 5, dorsocentrals about 30, posterior prealars 5, scutellum broken.

Wing. Setation: Brachiolum 5, R 57, R_1 53, R_{4+5} 90, squama about 56 bi- or multiserial.

Leg. LR fore missing, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: mid 76, hind 102.

Genitalia (Figs 18, 19). Chitinized ventral ridge of VIII weak with one seta. Dorsomesal lobe of gonopophysis VIII large, microtrichia not extending to edge. Ventrolateral lobe (Fig. 19, right) with long microtrichia. Apodeme lobe (Fig. 19, left) relatively large with well chitinized base and long microtrichia. Gonocoxapodeme narrow but broad towards ventral mid line, not joined (Fig. 18). Coxosternapodeme narrow and curved. Gonocoxite IX well developed with 4 setae. Segment X with about 10 setae per side, post genital plate pointed. Labia without microtrichia. Seminal capsules ovoid with short neck, 155 µm long, ducts almost straight with common opening.

Specimens examined. 2♂♂ netted near Lake Awasa, 84/2/11; 1♂, 1♀ netted near L. Awasa, 84/8/25.

Comments. Freeman considered this species to be similar to the Palaearctic species *C. paganus* Meigen because of the structure of the superior volsella. This species is used for the diagnosis of the genus *Einfeldia* by Cranston et al. (1989).

Nevertheless, *imicola* only resembles their concept of *Einfeldia* in the structure of the superior volsella. It differs in that the scutum has a tubercle, the squama has a large number of setae, and the anal bands are strong, joining anteriorly to the anal tergite setae. The female genitalia are very similar to those of the other species of *Chironomus* described here, except *formosipennis* and those of *plumosus* (L) (Saether 1977), but differ markedly from those of *E. pagana* in that the gonocoxapodemes of VIII are not joined mesally anterior to the vagina (Saether 1977).

C. imicola may belong to the subgenus *Lobochironomus*, but this placement must wait until this subgenus has been defined for the female and immatures, and the immatures of *imicola* have been described.

Ecology. Although adults were netted near the shore of Lake Awasa no larvae were found during an extensive survey (Tilahun Kibret & Harrison 1989). The larvae must have been developing in the swampy area near the lake.

Distribution. Most of Afrotropical region as far south as the Transvaal, also Madagascar (ZSM unpubl.).

Chironomus transvaalensis Kieffer

Chironomus transvaalensis, Freeman 1957.

Only one male was collected.

Adult male (N = 1 mounted). The male has been described well by Freeman and is not detailed again here.

The larva and pupa are described by McLachlan (1969).

Specimen examined. 1♂, at lights, Lake Ziway, 82/12/31.

Distribution. Afrotropical region, Israel (Laville & Reiss 1993).

Cryptochironomus diceras Kieffer

Chironomus (Cryptochironomus) diceras, Freeman 1957.
Cryptochironomus diceras, McLachlan 1969; Freeman & Cranston 1980; Cranston & Judd 1989.

The male adult only is described.

Adult male (N = 1 mounted). Freeman's description is supplemented as follows:

Wing length 2.2 mm.

Head. AR 2.3. Frontal tubercles absent. Palp segments: 37, 47, 133, 115, 171 µm. Two subapical sensilla on segment 3.

Thorax. Scutal tubercle absent. Setation: Lateral antepronotals 4, dorsocentrals 12 uniserial, posterior prealars 4, scutellars 8 per side biserial.

Wing. Setation: Brachiolum 2, R 14, R_1 8, R_{4+5} 16, squama 4.
Leg. LR fore 1.7, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: mid 11, hind 5.
Hypopygium (Fig. 26). Strong anal tergite bands joining well anterior to anal point and extending to point as a broad ridge; anal point fairly broad with dorsal ridge extending forwards a short distance onto the anal tergite. Superior volsella small, bent with 2 setae. Inferior volsella very small with two setae (Fig. 26, right). Gonostylus fused with gonocoxite.

Adult female. Freeman (1957) gives a short description but does not illustrate the genitalia.

Pupa. McLachlan (1969) states that the pupa is similar to those of *C. lindneri* and *C. neonilicola*.

Larva. McLachlan shows that the larva differs from that of *lindneri* in that it has a fine seta subdentalis on the mandible and the 4th tooth on the mentum is much taller than the inner teeth.

Specimens examined. Adults: 1♂ caught at lights, Lake Langano, 83/3/14; 3♂♂ at lights, L. Langano, 83/12/11.

Comments. The superior volsella does not cover the inferior in all specimens and lies well dorsal to it.

Ecology. Although all the adults were caught on the shores of Lake Langano no larvae that could belong to this species were caught in the lake, or in the outflow stream of the lake or in any of the lakes nearby.

Distribution. Over most of sub-Saharan Africa and in the Arabian Peninsula (Cranston & Judd 1989).

Cryptochironomus lindneri (Freeman)

Chironomus (*Cryptochironomus*) *lindneri* Freeman, 1957.
Cryptochironomus lindneri, McLachlan 1969; Freeman & Cranston 1980.

The male adult, the pupa and the larva were associated by means of a male pupa with larval head capsule attached. No adult female was found but some information is available from a female pupa.

Adult male (N = 3 mounted). Freeman's description is augmented as follows: Wing length 3.4 mm.
Head. AR 3.0. Frontal tubercles present. Palp segments: 86, 81, 152, 136, 236 µm. No subapical sensilla on segment 3.
Thorax. Scutum not projecting over antepronotum; very small scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals 18 irregularly biserial, posterior prealars 6, scutellars 6 per side biserial.
Wing. Setation: Brachiolum nil, R 21, R_1 nil, R_{4+5} 6 towards tip, squama 24.
Leg. LR fore 1.4, mid 0.5, hind 0.4. Sensilla chaetica on tarsomere 1: mid 3-7, hind 4-5; one male had one sensilla on tarsomere 2 of one midleg. Slight beard on tarsomeres 1 and 2 of foreleg.
Hypopygium (Fig. 27). Anal point dorsally is smooth and runs forward as a ridge a short distance onto the anal tergite; ventrally there is a narrow setigerous portion extending just over halfway to the tip. The inferior volsella is under the superior, strongly chitinized with three marginal setae.

Adult female. No females were collected but some information was obtained from a developing female in a pupa; chitinization was at an early stage so some details could not be seen.
Genitalia (Fig. 28). Similar to generic definition. Gonocoxapodeme VIII joined mesally. Gonopophysis: dorsomesal lobe with long microtrichia, ventrolateral lobe broad with long microtrichia; apodeme lobe present, shape indistinct, with microtrichia. Gonocoxite IX too undeveloped to show seta.
Notum thin with small ramus dorsal to anterior part of dorsomesal lobe of VIII. Post genital plate triangular, cerci normal, 155 µm. Seminal capsules ovoid, 109 µm, ducts straight, with common opening.

Pupa (N = 2 mounted). The specimens were whole pupae, not exuviae; dark brown in colour and strongly chitinized.
Cephalothorax. Surface granulose, denticles broadly rounded. Cephalic tubercles unbranched, elongate, curved forwards with very small subterminal seta. No cephalic warts; thoracic horn plumose with many fine branches, basal ring oval; prealar tubercle blunt. Setation: Precorneals 2, antepronotals 2, dorsocentrals 2 pairs.
Abdomen (Figs 29-31). Surface of all tergites and sternites I-VIII strongly reticulate (not shown in figures). Tergite I with no spines; II with hook row interrupted medially (Fig. 29); III-VI with posterior

row of about 20 irregular, strong spines. Pedes spurii B anterior on segment I, posterior on II (Fig. 29); pedes spurii A on IV. Sternite I with large anterolateral tubercles covered with triangular spines, and with wide anteromedial tubercle; posterior row of large spines on sternites I-VII. Segment VIII without posterolateral spine or comb. Segment I without L setae, II-IV with 3, V-VI with 4 lamelliform L setae and VIII with 5. Anal lobe well developed with complete fringe of about 85 lamelliform setae and one dorsal lamelliform seta. Fig. 30 shows male from dorsal aspect and Fig. 31 shows female from ventral aspect.

Larva (N = 12 mounted). Head Capsule length 0.6 mm.

Antenna (Fig. 32). AR 1.25, basal segment slightly shorter than flagellum, blade arising in distal half of segment 2, accessory blade short. Lauterborn organs absent.

Labrum. Very similar to that illustrated by Pinder & Reiss (1983), with blade-like S I and S II. Pecten epipharynx (Fig. 33) a triangular plate divided into 3 lobes, central lobe pointed. Premandible with 5 teeth, brush present.

Mandible (Fig. 34). Teeth almost black, seta subdentalis broad; seta interna present but not in figure. Pecten mandibularis absent.

Mentum (Fig. 35). Teeth almost black except for pale central tooth; 6 lateral teeth; actual shape of medial portion could not be seen clearly on any specimens. Ventromedial plate wide, wrapping around head capsule laterally.

Maxilla (Fig. 36). Palp large and long, a-seta present but b-seta could not be seen, chaetulae of palpiger reduced to 3, sensilla basicona long. Paraxial seta small, antaxial seta very long and curved, very few lacinal setae.

Body. Claws of anterior parapod serrate, mostly long and thin, posterior claws simple. Anal tubercles short and conical.

Specimens examined. Adults: 1♂ at lights, Lake Ziway, 81/4/15; 3♂♂ at lights, L. Awasa, 81/4/15; 1♂, at lights, L. Ziway 82/12/31; 3♂♂, at lights, L. Langano, 83/12/11; 1♂, swarming at dusk, near L. Abijata, 85/6/18. Pupae: 1♂ with larval exuviae attached, and 1♀, L. Ziway, Jan. 1985. Larvae: Numerous specimens from L. Ziway (col. C. Tudorancea) during 1985, and from L. Awasa (col. ADH) during 1983.

Comments. This species conforms closely to the generic definition but the pupa differs in that it has pedes spurii B on segment II and no posterolateral spines or combs on VIII. It is notable that *C. supplicans* Meigen (Pinder & Reiss 1986, Langton 1984) also lacks these structures. The larva differs from C. sp. (Pinder & Reiss 1983) as the central lobe of the pecten hypopharynx has one point, not two; it also has a broad seta subdentalis on the mandible. McLachlan's pupa is very similar; his figure of the larval mandible also shows the broad seta subdentalis, and his mentum is similar.

Ecology. The larvae were found living in the muddy bottom of the shallow Lake Ziway (Tudorancea et al. 1989) and from the bottom of L. Awasa (Tilahun Kibret & Harrison 1989). McLachlan (1969) found them in a similar habitat on the bottom of L. Kariba, Zimbabwe.

Distribution. Most of sub-Saharan Africa (Freeman 1957).

Cryptochironomus sp. A

One unassociated female was collected from Lake Awasa.

Adult female (N = 1 mounted). Wing length 1.8 mm.

Head. AR 0.7. Frontal tubercles minute. Palp segments 47, 40, 93, 124, 186 µm. 3 subapical sensilla on segment 3. Thorax. Scutal tubercle present. Setation: Lateral antepronotals nil, dorsocentrals 12, posterior prealars 4, scutellars 6 per side.

Wing. Setation: Brachiolum 2, R 12, R_1 6, R_{4+5} 11, squama 14.

Leg. LR fore 1.5, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg about 50 biserial, hindleg nil.

Genitalia (Figs 37, 38). Ventral ridge of VIII small. Dorsomesal lobe with long microtrichia; ventrolateral lobes large; apodeme lobes (Fig. 37, left) with small chitinized base and microtrichia. Gonocoxapodemes narrow and joined. Coxosternapodemes dark and curved. Gonocoxite IX with 2 setae. Segment X with 3 setae per side; postgenital plate pointed. Labia without microtrichia. Seminal capsules (Fig. 38) ovoid, 99 µm long, ducts almost straight, wider in lower half and with common opening.

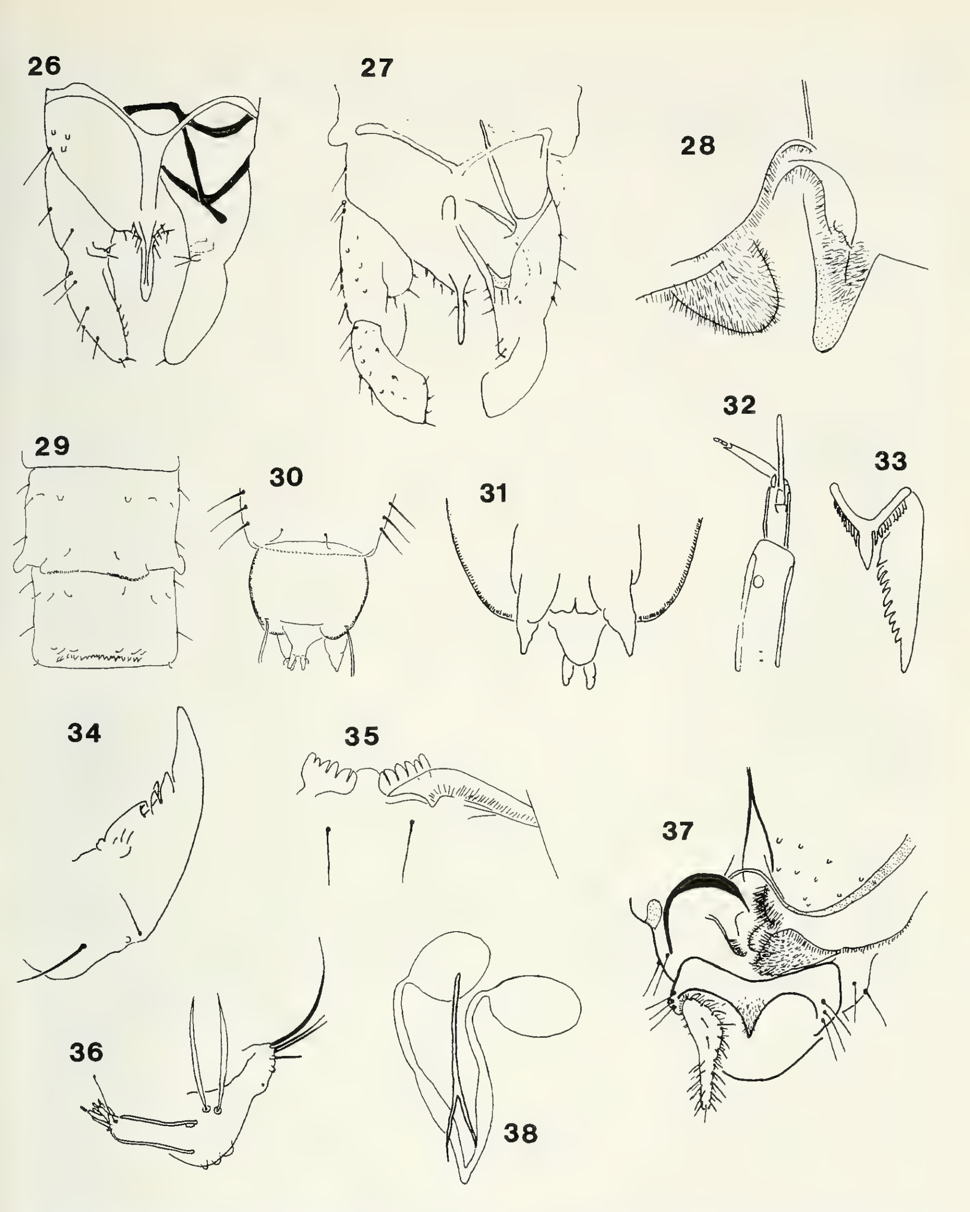


Fig. 26. *Cryptochironomus diceras*. Hypopygium.
Figs 27-36. *Cryptochironomus lindneri*. Adult: 27. Hypopygium, 28. Female genitalia. Pupa: 29. Abdomen, tergites II, III. 30. ♂ abdomen, dorsal. 31. ♀ abdomen, ventral. Larva: 32. Antenna. 33. Pecten epipharynx, chaetula. 34. Mandible. 35. Mentum. 36. Maxilla.
Figs 37-38. *Cryptochironomus* sp. A. 37. ♀ genitalia, ventral. 38. Seminal capsules, ducts.

Specimen examined. 1♀ netted on shore of Lake Awasa, 84/2/11.

Comments. This female has been assigned to *Cryptochironomus* as it has a small dorsomesal lobe and a large ventrolateral lobe and other features described for this genus by Saether (1977). It does not seem

to be the female of *C. diceras* as the male of this species has no scutal tubercle whereas this female has one.

Ecology. The larva may have been living in the weed beds of L. Awasa.

Distribution. Ethiopian Rift Valley.

Dicrotendipes fusconotatus (Kieffer)

Chironomus (Dicrotendipes) fusconotatus, Freeman 1957.
Dicrotendipes fusconotatus, Freeman & Cranston 1980; Contreras-Lichtenberg 1986; Epler 1988.

Freeman describes the male and gives a short description of the female, Contreras-Lichtenberg describes the larva, pupa and male and Epler describes the larva and pupa. The female is described here.

Adult male (N = 2 mounted). Wing length 1.8 mm.

Head. AR 2.4. Small frontal tubercles. Palp segments: 31, 43, 105, 130, 208 µm. No sensilla on segment 3.

Thorax. Scutal tubercle present, Setation: Lateral antepronotals nil, dorsocentrals 20 partly biserial, posterior prealars 4, scutellars 10 per side partly biserial.

Wing. With markings as in Freeman plate 1d. Setation: Brachiolum 2, R 23, R_1 8, R_{4+5} nil, squama 16.

Leg. LR fore 1.5, mid 0.45, hind 0.63-0.67. Distal stripe on femur, knee light, proximal stripe on tibia. Sensilla chaetica on tarsomere 1: mid 5-6, hind nil. Hypopygium. As described by Contreras-Lichtenburg and Freeman, and as follows. Pair of membranous processes (hyaline lobes) lateral to anal point. Superior volsella has one terminal seta (Fig. 39). Inferior volsella (Fig. 40, dorsal aspect) has 7 large setae irregularly arranged at tip, plus 3 small ones; the branch has 5 large setae in a row.

Adult female (N = 3 mounted). Wing length 2.5 mm.

Head. AR 0.5. Small frontal tubercles. Palp segments: 37, 47, 136, 130, 192-202 µm. No subterminal sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral anteprontals nil, dorsocentrals 32 partly biserial, posterior prealars 5, scutellars 12 per side biserial.

Wing. Markings similar to male. Setation: Brachiolum 2, R 21, R_1 17, R_{4+5} 23, squama 18.

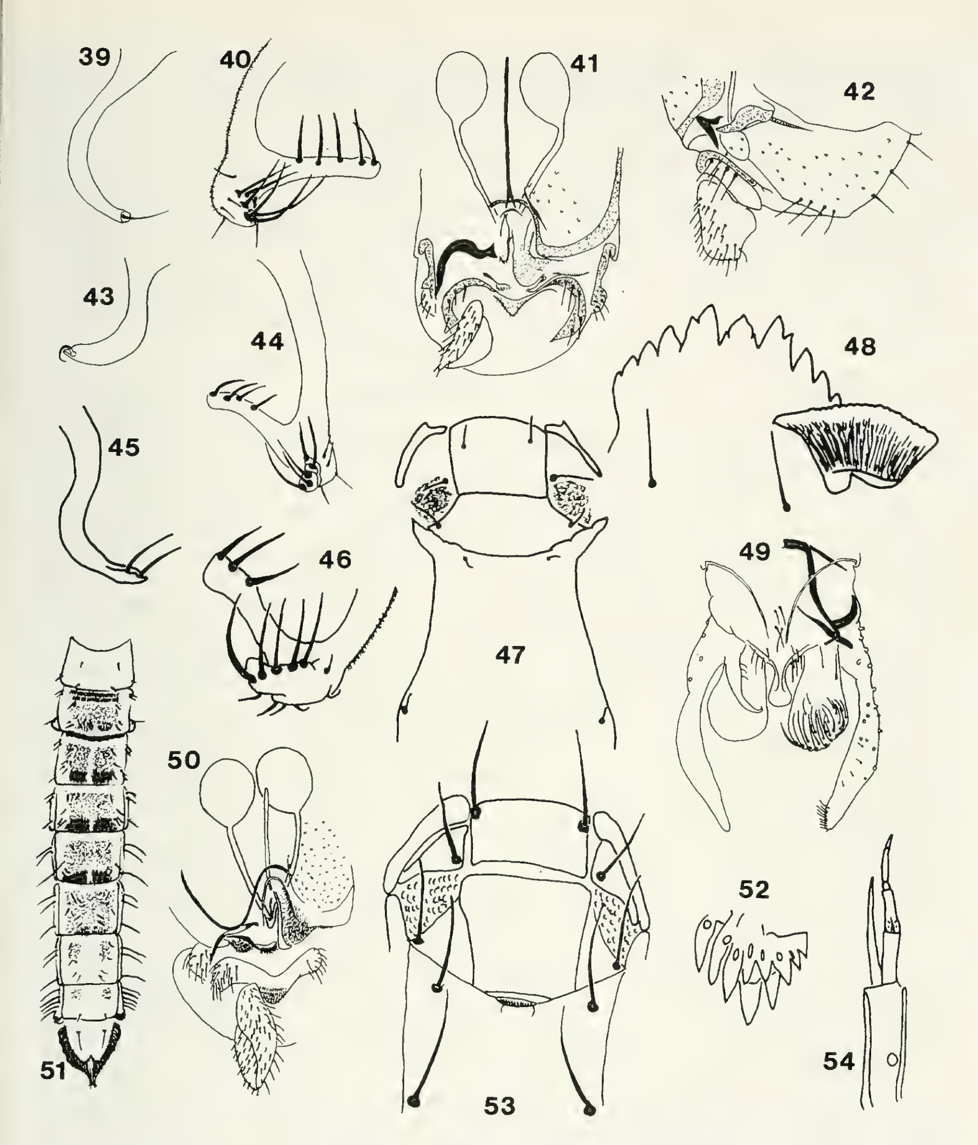
Leg. LR fore 1.4, mid 0.5, hind 0.6. Markings as in male. Sensilla chaetica on tarsomere 1: mid 50 biserial, hind nil.

Genitalia (Figs 41, 42). Sternite VIII brown as it is well chitinized. Ventral ridge of VIII small but strongly chitinized. Dorsomesal lobe large, microtrichia extending to edge (Fig. 41, right). Ventrolateral lobe appears small in ventral view (Fig. 41, right) but is large and lies ventro-dorsally; microtrichia short. Apodeme lobe (Fig. 41, left) with small chitinized base and long microtrichia. Gonocoxapodemes broad and joined. Coxosternapodemes dark and curved. Gonocoxite IX small with 3 setae, strongly chitinized (Figs 41, 42). Segment X with 5 setae per side, strongly chitinized, postgenital plate pointed. Labia without microtrichia. Seminal capsules ovoid with short neck; 109 µm long, ducts almost straight, wider central part glandular, with common opening.

Pupa (N = 2 mounted). Similar to those described for this species by Contreras-Lichtenberg and by Epler. Tergite II has 58-60 hooklets in the posterior row. There is some variation in the number of caudolateral spines on segment VIII, the one pupa has 2 on the left and 3 on the right and the other has 3 on the left and 4 on the right. Segment I without L setae, II with 1 and II and IV with 2, V-VII with 4 lamelliform L setae and VIII with 5. Anal fin with about 60 setae.

Larva (N = 10 mounted). Ethiopian larvae closely resemble those described by Contreras-Lichtenburg and by Epler. The maxilla is similar to that ilustrated by Epler (his Fig. 7B & C). The chaetulae of the palpiger are numerous and with points but longer than those he illustrated; a-seta is present and one lacinal chaeta is pectinate.

Specimens examined. Adults: Numerous ♂♂ and some ♀♀, at lights, Lake Ziway, 81/4/15, 82/12/31; ♂♂ and ♀♀, at lights, L. Awasa, 81/4/15, 84/2/10; 1♂, mountains behind Addis Ababa, 81/4/14; ♂♂ and ♀♀, at lights, L. Langano, 83/3/14; ♂♂ and ♀♀, at lights, L. Abaya, 84/2/26; 1♀, Amibara Irrigation Project, middle Awash River, 84/11/10; 1♂ bred out in lab from water collected in pool on Abo River, ET.1, 85/5. Pupae: 2, Hora Kela Shet, ET 33, 84/2/24. Larvae: 3, L. Awasa, 1983; 7, Lake Ziway, 1984, 1, Hora Kela Shet, ET.33, 84/2/24.



Figs 39-42. *Dicrotendipes fusconotatus*. Adult: 39. Superior volsella. 40. Inferior volsella. 41. ♀ genitalia, ventral. 42. ♀ genitalia, lateral.
Figs 43-44. *Dicrotendipes peringueyanus*. Adult: 43. Superior volsella. 44. Inferior volsella.
Figs 45-48. *Dicrotendipes sudanicus*. Adult: 45. Superior volsella. 46. Inferior volsella. Larva: 47. Dorsal surface of Head. 48. Mentum.
Figs 49-54. *Kiefferulus chloronotus*. Adult: 49. Hypopygium, ventral. 50. ♀ genitalia, ventral. Pupa: 51. Abdomen. 52. Anal comb. Larva: 53. Dorsal surface of Head. 54. Antenna.

Comments. The inferior volsella (Fig. 40) is very similar to that illustrated by Contreras-Lichtenberg. The female is distinctive because of the strong chitinization of the genitalia.

Freeman (1957) and Epler (1988) have suggested that *Dicrotendipes peringueyanus* Kieffer may be a

variant of *D. fuconotatus*, in spite of its different pattern of wing spots. However, Figs 43 and 44 show that there are also differences in the hypopygial structure: the superior volsella is much shorter and has one curved seta at the tip; the inferior volsella has 5 large setae at the tip and 4 setae on the branch. (Specimen from Upington, Orange River, South Africa 1992 col. O. R. Palmer.)

Ecology. Larvae were found on the shallow bottom of L. Ziway (Tudorancea et al. 1989) and in the weed beds of L. Awasa (Tilahun Kibret & Harrison 1989). Larvae and pupae were found in the slow-flowing Hora Kela Shet, the outlet of Lake Langano. Adults were caught near small water bodies above Addis Ababa, at the Amibara Irrigation Project, and one was bred out from water from a pool in a torrential mountain stream.

Distribution. Afro-tropical Region, eastern Mediterranean Region, and North Africa (Contreras-Lichtenberg 1986).

Dicrotendipes sudanicus Freeman

Chironomus (Dicrotendipes) sudanicus Freeman, 1957; *Dicrotendipes sudanicus*, McLachlan 1969; Freeman & Cranston 1980; Cranston & Judd 1984; Epler 1988.

Only males were collected in Ethiopia.

Adult male (N = 3 mounted). Colour. As in Freeman; wings with no discrete spots but clouds present over cross veins, posterior fork and Cu and in anal angle.

Wing length 1.6-1.9 mm.

Head. AR 2.4. Frontal tubercles small and narrow, about 3.5× as long and wide. Palp segments: 37, 53, 124, 130, 208 µm. No sensilla on palp segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals nil, dorsocentrals 13 uniserial, posterior prealars 5, scutellars 6 uniserial.

Wing. As in Freeman. Setation: Brachiolum 2, R 15, R_1 7, R_{4+5} 5, squama 7.

Leg. LR foreleg 1.8, midleg 0.47-0.52, hindleg 0.64-0.65. Sensilla chaetica on tarsomere 1: midleg 9, hindleg nil.

Hypopygium (Figs 45, 46): Both Freeman and Epler state that the hypopygium is very similar to that of *D. fusconotatus*. However, the three specimens examined here show consistent differences. The superior volsella (Fig. 45) has two terminal setae whereas that of *fusconotatus* (Fig. 39) has only one. The inferior volsella (Fig. 46) has 5 large terminal setae and the branch has 3, whereas *fusconotatus* has seven irregularly arranged large terminal setae with 5 on the branch (Fig. 40). Contreras-Lichtenberg (1986) gives a similar illustration of the inferior volsella of *fusconotatus*.

Adult female. Freeman says that the female is very similar to the male.

Pupa. Epler says that the pupa is similar to that of *D. fusconotatus* but that it is smaller, has fewer anal lobe setae (35-47 instead of 61-78) and that dorsocentral seta 2 is closer to Dc_1 instead of to Dc_3. McLachlan's illustration shows 4 posterolateral spines on the abdomen, 2 large and 2 small.

Larva. Both McLachlan and Epler describe the larva. Most of the appendages on the head capsule are similar to those of *D. fusconotatus*, but the second lateral tooth of the mentum is adpressed to the first lateral, whereas in *fusconotatus* it is separate. The ventromental plates have mostly smooth anterior margins or sometimes with "extremely shallow crenulations" (Epler).

McLachlan's specimens came from Lake Kariba, Zimbabwe. A number of 4th instar larvae from this lake, collected by Dr. P. Boon, (N = 21 mounted) were examined and gave the following extra details:

Dorsal surface of head (Fig. 47). Frontal apotome: centre of anterior margin smooth, with no frontal process or mark on any of the specimens. Labial sclerites 1 and 4 appear to be fused and 3 is not clearly defined.

Mentum (Fig. 48). This figure shows an unworn mentum; central tooth has a notch on either side and second lateral tooth is clearly fused to first. Ventromental plates have shallow crenulations; there are about 26 strial ridges.

Specimens examined. 3♂♂, at lights, Amibara Irrigation Project, Middle Awash River, 84/11/10; 21 larvae, Lake Kariba, Zimbabwe, 1982.

Comments. Epler seems to doubt the validity of this species. However, it is clearly distinct from all other species known from the Afrotropical region. Both male and female adults can be distinguished by their distinctive wing pattern of clouds over the veins, instead of spots in the cells. The larva can be distinguished by the mentum with the first and second lateral teeth fused in combination with the anterior crenulations of the ventromental plate, and by the frontal apotome with no frontal process or mark.

Ecology. This species appeared to be breeding, with *fusconotatus*, in the irrigation ditches or nearby ponds at the irrigation works at the middle Awash. In Lake Kariba it was found in the weed beds.

Distribution. Throughout tropical Africa, but not yet found south of Zimbabwe.

Harnischia curtilamellata (Malloch)

Chironomus (*Cryptochironomus*) *nudiforceps* Kieffer, Freeman 1957; *Harnischia curtilamellata*, Freeman and Cranston 1980.

The male is described, and a female that is considered to belong to the same species.

Adult male (N = 5 mounted). Similar to generic definition although the gonostyli are longer and more curved than is typical for the genus.

Wing length 1.6 mm.

Colour. Mostly green in life, thoracic vittae brown, abdomen plain green.

Head. AR 1.8. Eye of *Harnischia* type, with long, parallel-sided dorsomedial extension; frontal tubercles vestigial; dorsal part of tentorium normal (Fig. 20). Palp segments: 49, 31, 124, 127, 171 µm. No subapical sensory sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 2-5, dorsocentrals 7-8, acrostichals 3, posterior prealars 3-4, scutellars 4 per side uniserial.

Wing. With distinct anal lobe. Setation: Brachiolum 1 or 2, R6-9, R_1 nil, R_{4+5} nil, squama 7-8.

Leg. LR fore 1.8-2.0, mid 0.5, hind 0.7. Apex of fore tibia with low rounded projection. Combs of mid and hind tibia contiguous, each with one spur. Sensilla chaetica on tarsomere 1: mid 3, hind nil.

Hypopygium (Fig. 21). Anal tergite bands joined, no median setae, apical setae weak. Anal point long with central ridge running forward onto anal tergite to form a high keel; tip of anal point bare but setae and microtrichia ventrally almost to tip (Fig. 22). Superior volsella vestigial, more obvious in some specimens than in others (Fig. 23). Inferior volsella also vestigial or absent. Gonostylus of moderate length, inner margin weakly concave, fused basally with gonocoxite.

Adult female (N = 1 mounted). Colour and general structure of thorax and combs on legs similar to male.

Wing length 1.6 mm.

Head. Antennae broken. Eyes of *Harnischia* type with long, parallel-sided dorsomedial extensions. Frontal tubercles minute, 6 µm long. Palp segments: 47, 43, 102, 121, 192 µm.

Thorax. Antepronotum similar to male, notched but not completely divided dorsomedially; scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals 10, posterior prealars 4, scutellars 6 per side.

Wing. Shape and venation similar to male. Setation: Brachiolum 2, R 14, R_1 9, R_{4+5} 8, squama 9.

Leg. LR fore 1.5, mid 0.55, hind 0.58. Projection on fore tibia, and combs and spurs on mid and hind tibia similar to male. Sensilla chaetica on tarsomere 1: mid 24, hind nil.

Genitalia (Figs. 24, 25). Gonocoxapodeme VIII rounded caudally but not joined mesally. Gonopophysis VIII with small dorsomesal lobe and large ventrolateral lobe. Apodeme lobe weak but with microtrichia. Coxosternapodeme weak and yellowish. Gonocoxite IX rounded with 3 setae. Segment X with one seta per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules (Fig. 25) ovoid and aligned in a dorsoventral position. Spermathecal ducts attached ventrally, proximal narrow portion slightly convoluted but becoming greatly widened and straight with common opening.

Pupa and larva. For pupa see Pinder & Reiss (1986) and for larva Pinder & Reiss (1983).

Specimens examined. 1♂ and 1♀, at lights, Lake Ziway, 82/12/31; 2♂♂, at lights, L. Langano, 83/12/11; 2♂♂ swarming at dusk near L. Abijata, 85/1/18.

Comments. According to Dr. F. Reiss (personal communication) this is a very variable species but "specific is the longitudinal central ridge of the broadened anal point in combination with its setation reaching nearly to the tip" The female resembles that illustrated for this species by Saether (1977) with its small dorsomesal lobe and large dorsolateral lobe of gonopophysis VIII, but the peculiar spermathecal ducts are unlike those he describes. In fact they are unlike any others he describes for the Chironomidae.

Ecology. *Harnischia* larvae occur in the soft sediments of lakes and larger rivers (Pinder & Reiss 1983) but none was caught during the survey of the Ethiopian lakes.

Distribution. Africa, Holarctic and Australasian region (Dr. F. Reiss, private communication).

Kiefferulus chloronotus (Kieffer)

Chironomus (*Dicrotendipes*) *chloronotus*, Freeman 1957; *Dicrotendipes chloronotus*, McLachlan 1969; *Kiefferulus chloronotus*, Freeman & Cranston 1980.

Freeman describes the male and gives a short description of the female; McLachlan describes the larva and pupa. More details of these stages and a description of the female is given here.

Adult male (N = 1 mounted). Wing length 3.1 mm.

Head. AR 2.5. Frontal tubercles very small. Palp segments: 59, 53, 186, 202, 295. 3 or 4 subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals nil, dorsocentrals 9 uniserial, posterior prealars 4, scutellars 4.

Wing. Setation: Brachiolum 2, R 34, R_1 33, R_{4+5} 34, squama 8.

Leg. LR fore 1.8, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 9, hindleg 5.

Hypopygium (Fig. 49). Anal tergite bands strong, 4 median anal tergite setae beween bands, about 6 apical anal tergite setae per side; anal point apically broad and downturned. Superior volsella inwardly curved, dorsal setae and microtrichia on base. Inferior volsella very broad distally with long curved setae. Gonostylus distally constricted bearing 10 curved setae at tip.

Adult female. No adult females were available but the following information is from a pharate specimen:

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 24 partly biserial, posterior prealars 8, scutellars 8.

Leg. Sensilla chaetica on tarsomere 1: midleg 86 mostly biserial, hindleg about 52.

Genitalia (Fig. 50). Sternite VIII well chitinized and brown, ventral ridge poorly developed. Gonocoxapodemes brown, narrow and joined (left). Dorsomesal lobe large, microtrichia do not extend to edge (Fig. 50, right). Ventrolateral lobe small (left). Apodeme lobe (left) large with microtrichia and well chitinized base. Coxosternapodemes small and dark only at extremities. Gonocoxite IX large with about 10 setae (left). Segment X with 14-15 setae per side, postgenital plate broadly rounded. Labia without microtrichia. Seminal capsules broadly ovoid with no necks, 146 µm long, ducts almost straight, glandular for most of length, with common opening.

Pupa (N = 8 mounted). Cephalothorax. Cephalic tubercles very small and short, width equals height, short seta almost terminal; cephalic surface very finely pebbled, humeral callous coarsely pebbled. Setation: All setae small, precorneals 2, antepronotals 2, dorsocentrals 4 close together.

Abdomen (Fig. 51). All tergites, except I, have some shagreen: II-V almost completely covered, shagreen points on II-V become large spines posteriorly, but smaller on V; II has also a longitudinal patch of larger spines anteriorly; no spinules in conjunctives. Hook row on II with no median division. Pedes spurii B on segment II, but no pedes spurii A. Anal comb on segment VIII (Fig. 52) with about 10 brown, strong spines. Abdominal setation as in Figure 51. Segment I with 1 L seta, II-IV with 3, V with 3 lamelliform setae, VI and VII with 3 or 4 lamelliform setae, the 4th is very small and not shown in the figure, VIII with 5 lamelliform setae, the 5th is very small. Anal lobe with long lamelliform dorsal setae in addition to fringe of about 180 setae.

Larva (N = 14 mounted). Colour. Dorsal surface of head capsule light brown, ventral surface dark brown.

Head capsule length 754-793 μm.

Dorsal surface of head (Fig. 53). Frontal apotome with transverse eliptical pit on anterior margin, margin smooth, labial sclerites 1 and 2 clearly separated.

Antenna (Fig. 54). Blade reaching to base of the 4th segment, accessory blade only about 0.25× length of segment 2, Lauterborn organs and small style distally on segment 2.

Labrum (Fig. 55). S I palmate with 7-8 points, S II large and simple. Pecten epipharynx with about 21 teeth of irregular length; premandible (not in figure) with 6 pointed teeth and brush.

Mandible (Fig. 56). Dorsal tooth pale, other teeth dark. Seta subdentalis short with many points (see Comments).

Mentum (Fig. 57). Trifid central tooth with 6 lateral teeth per side, second lateral tooth largely fused to first; 4th lateral tooth smaller and shorter than 5th. Ventromental plate wider than mentum, dorsal margin finely crenate.

Maxilla (Fig. 58). Pectinate chaeta almost as long as lacina, one of the shorter dorsal chaetae also pectinate; large dorsal group of chaetulae of palpiger, some as long as the palp. Paraxial and antaxial setae both small.

Body. Claws of anterior parapods short, small and in definite rows, tips serrate; claws of posterior parapods simple; anal tubules shorter than parapod, with bluntly rounded tips.

Specimens examined. 1♂, at lights, Lake Langano, 83/12/11; numerous larvae and pupae, L. Ziway, 84/10/5, 85/4/1 (col. C. Tudorancea).

Comments. The female genitalia differ markedly from those described for *Kiefferulus dux* (Joh.): gonocoxapodemes of VIII are joined mesally and gonocoxite IX is not small and has many setae. Spatulate shape of seta subdentalis of larval mandible could be produced by wear as end seems to be ragged in appearance; this is borne out by the fact that McLachlan's specimen has a seta with a single point reaching up to the 3rd tooth.

Ecology. McLachlan's specimens were found on dead submerged trees in Lake Kariba, Zimbabwe; those from L. Ziway were found during extensive sampling of the bottom of this shallow lake; they were in a few, dense patches (Tudorancea et al. 1989).

Distribution. Most of Afrotropical region including southern tip of South Africa, Israel (Laville & Reiss 1993).

Kiefferulus disparilis (Goetghebuer)

Chironomus (*Endochironomus*) *disparilus*, Freeman 1957;
Endochironomus disparilis, Freeman & Cranston 1980;
Kiefferulus disparilis, Cranston & Judd 1989.

Freeman describes the male and gives a short description of the female; Cranston & Judd give detailed descriptions of the male, the pupa and the larva. Some further details of the male, the pupa and the larva, and a description of the female are given here.

Adult male (N = 4 mounted). As Cranston & Judd point out, this species does not conform closely to the generic definition.

Wing length 3.6 mm.

Head. AR 3.0. Frontal tubercles small, 15 μm long, 6 μm wide. Palp segments: 62, 56, 158, 180, 242 μm. About 5 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 18 uniserial, posterior prealars 7, scutellars 9 per side partly biserial.

Wing. Setation: Brachiolum 3, R 31, R_1 26, R_{4+5} 30, squama 14.

Leg. LR fore 1.4, mid 0.5, hind 0.65. Sensilla chaetica on tarsomere 1: midleg 15, hindleg 12.

Hypopygium. As per Freeman, and Cranston & Judd.

Adult female (N = 3 mounted). Wing length 3.7 mm.

Head. AR 0.38. Small frontal tubercles, similar to male. Palp segments: 96, 52, 171, 192, 233 μm. 4 or 5 subapical sensilla on segment 3.

Thorax. Very small scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 11, posterior prealars 7, scutellars 5 per side.

Wing. Setation: Brachiolum 3, R 37, R_1 32, R_{4+5} 35, squama 14.

Leg. LR fore 0.69, mid 0.64, 0.61. Sensilla chaetica on tarsomere 1: midleg 28, hindleg 24.

Genitalia (Figs 59, 60). Sternite VIII brown, well chitinized; ventral ridge well developed. Dorsomesal lobe large, microtrichia extending almost to edge (Fig. 59, right). Ventrolateral lobe appears small when seen edge on (Fig. 59, right) but is large when compressed into a lateral position. Apodeme lobe large with microtrichia and well chitinized base (Fig. 59, left). Gonocoxapodemes narrow and inner part obscure, not joined. Coxosternapodemes dark. Gonocoxite IX small with 3 setae, base chitinized (Figs 59, 60). Segment X with about 30 setae per side. Postgenital plate pointed. Labia without microtrichia. Seminal capsules almost spherical with short necks, 118 µm across, ducts slightly curved, wider central part gladular, with common opening.

Pupa (N = 5 mounted). Not similar to generic definition as it lacks postlateral spurs; it has been described by Cranston & Judd, but a few extra details are given here.

Cephalothorax. Cephalic tubercles short. Frontal setae short, inserted subterminally (similar to *Kiefferulus* I, Pinder & Reiss 1986); cephalic surface finely pebbled. Setation: Precorneals 2 very small, antepronotals 1 very small, 4 small dorsocentrals, 3 and 4 close together.

Abdomen. Hook row on tergite II with narrow median division; pattern of shagreen and spines on tergites as in Cranston & Judd. Pedes spurii B on segment II and pedes spurii A on segment 4. No postlateral spurs but some specimens have a small rudiment of 2 spines (as in Cranston & Judd). The condition of the specimens was too poor to determine the L setae accurately but the anal fins had about 120 setae.

Larva (N = 3 mounted). As described by Cranston & Judd, and as follows:

Head capsule length 650-715 µm.

Dorsal surface of Head. Anterior margin of frons has an oval pit and a distinct clypeus.

Labrum. 7-toothed premandible present.

Mandible. Has a short, apically broadened seta subdentalis with many points in unworn specimens, and an extended mola; lateral teeth 2-5 of the mentum are in the form of bicuspid molars.

Maxilla (Fig. 61, ventral). Has a large dorsal group of long chaetulae of the palpiger with multiple points, some shown in figure; pectinate chaeta is large and a-seta on the palp long.

Body. All claws of anterior and posterior parapods plain; anal tubules short and rounded.

Specimens examined. Numerous ♂♂, ♀♀, larvae and pupae from the crater Lake Aranguadi, near Debre Zeit, 82/12/29; numerous ♂♂, ♀♀, larvae and pupae from L. Abijata, 83/5/29, and 85/1/18, and from L. Shala 85/1/17.

Ecology. All the larvae were found in saline lakes. See Tudorancea & Harrison (1988) and Tudorancea et al. (1989)

Distribution. Afrotropical region and Saudi Arabia.

Kloosia africana Reiss

Kloosia africana Reiss, 1988.

Reiss (1988) describes the male and the pupa. The female and additional male features are described here.

Adult male (N = 4 mounted). Wing length 1.8 mm.

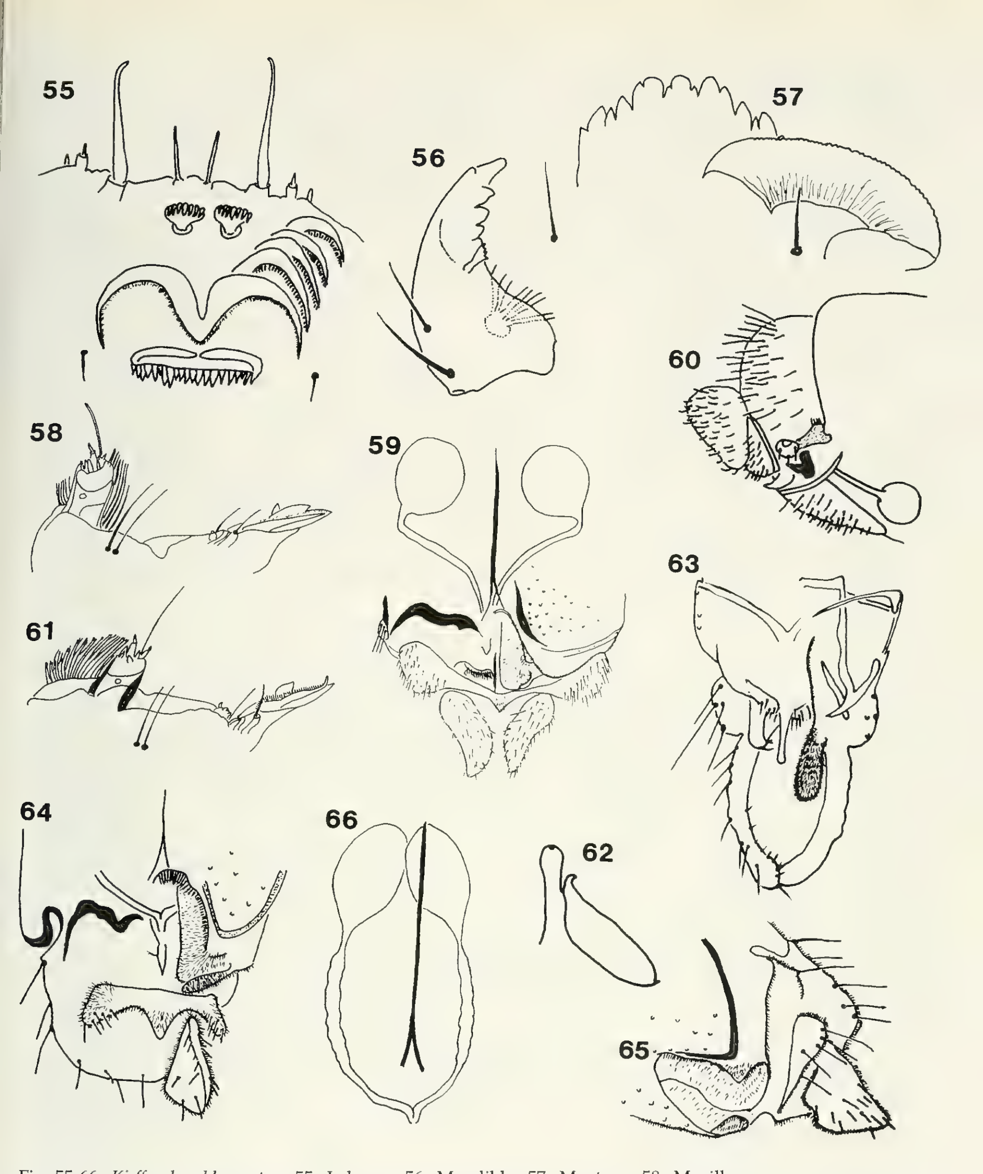
Head. AR 1.3. No frontal tubercles. Tentorium as in Fig. 62. Palp segments: 37, 40, 99, 102, 155 µm. No subapical sensilla on segment 3.

Thorax. Antepronotal lobes small, fused dorsally, not visible from above. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 10-13, posterior prealars 3, scutellars 4 per side.

Wing. Setation: Brachiolum 1, R 5-10, R_1 nil, R_{4+5} nil, squama nil.

Leg. LR fore 1.3, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg 3, hindleg nil.

Hypopygium (Fig. 63). Anal tergite bands Y-shaped; 9 or 10 apical anal setae per side; anal point slender, slightly widened apically and slightly downturned. Superior volsella with no microtrichia;



Figs 55-66. *Kiefferulus chloronotus*. 55. Labrum. 56. Mandible. 57. Mentum. 58. Maxilla.
Figs 59-61. *Kiefferulus disparilis* Adult: 59. ♀ genitalia, ventral. 60. ♀ genitalia, lateral. Larva: 61. Maxilla.
Figs 62-66. *Kloosia africana*. Adult: 62. ♂ head, tentorium. 63. Hypopygium. 64. ♀ genitalia, ventral. 65. ♀ genitalia, lateral. 66. Seminal capsules.

apex bearing two medial setae, and additional setae ventrally. Inferior volsella widening distally, rather flat, poorly chitinized, with dense microtrichia but no macrotrichia.

Adult female (N = 2 mounted). Wing length 1.6 mm.

Head. AR 0.44. No frontal tubercles. Palp segments: 40, 37, 99, 105, 177 µm; no subapical sensilla on segment 3.

Thorax. General structure similar to male. Setation: Lateral antepronotals nil, dorsocentrals 12, posterior prealars 4, scutellars 4 per side.

Wing. Shape and venation similar to male. Setation: Brachiolum 1, R 13, R_1 8, R_{4+5} 20, squama nil.

Leg. LR fore 1.4, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg 5, hindleg nil.

Genitalia (Figs 64-66). Dorsomesal lobe of VIII large; ventrolateral lobe well-developed; apodeme lobe not visible. Gonocoxapodemes not joined. Coxosternapodemes dark and sinuous. Gonocoxite IX reduced to small ridge with one large seta (Fig. 65). Segment X with 5 setae per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules ovoid with long, narrow necks (Fig. 66), 62 μm long, excluding neck, ducts almost straight, glandular, with distinct wider section joining neck, with common opening.

Pupa. Described by Reiss (1988).

Larva. Unknown.

Specimens examined. Adults: 3♂♂ and 2♀♀, at lights, Lake Langano, 83/3/14; 2♂♂, at lights, L. Langano, 83/12/11. South African specimens: 1♂, at lights, Standerton, Transvaal, 59/11/12; 1♂, Vaal River, Morgenzon-Amersfoort road, 60/12/6.

Ecology. No larvae possible for this species were found in Lake Langano but the adults could have come from slow-flowing sections of streams running into the lake. The South African specimens must have emerged from the Vaal River, probably from slow-flowing sections. Reiss's male adults were caught near a fast-flowing stream with a sandy bed.

Distribution. Northern Kenya, Ethiopian highlands and the Highveld of the Transvaal, S. Africa.

Microchironomus deribae Freeman

Chironomus (Cryptochironomus) deribae Freeman,1957.

Microchironomus deribae, Freeman & Cranston 1980; Cranston, Dillon, Pinder & Reiss 1989; Cranston & Judd 1989.

Males, females, pupae and larvae were associated by means of pupae containing pharate adults, one with larval head capsule attached.

Adult Male (N = 2 mounted). The hypopygium is illustrated by Freeman 1957, Cranston et al. 1989 and Cranston & Judd 1989, and is not described again here.

Wing length 1.7-2.3 mm.

Head. AR 3.0. Minute frontal tubercles. Palp segments: 31, 43, 105, 130, 186 μm. No subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals 9 uniserial, posterior prealars 3, scutellars 4 per side uniserial.

Wing. Setation: Brachiolum 2, R 3, R1 nil, R_{4+5} nil, squama about 30.

Leg. LR fore 1.36, mid 0.5, hind 0.68. Sensilla chaetica on tarsomere 1: midleg 12, hindleg nil.

Hypopygium. Very similar to those described by the authors listed above.

Adult female (N = 3 mounted). Wing length 2.5 mm.

Head. AR 0.7. Minute frontal tubercles. Palp segments: 47, 50, 90, 121, 180 μm. No subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 3, dorsocentrals 12 uniserial, posterior prealars 4, scutellars 5 per side.

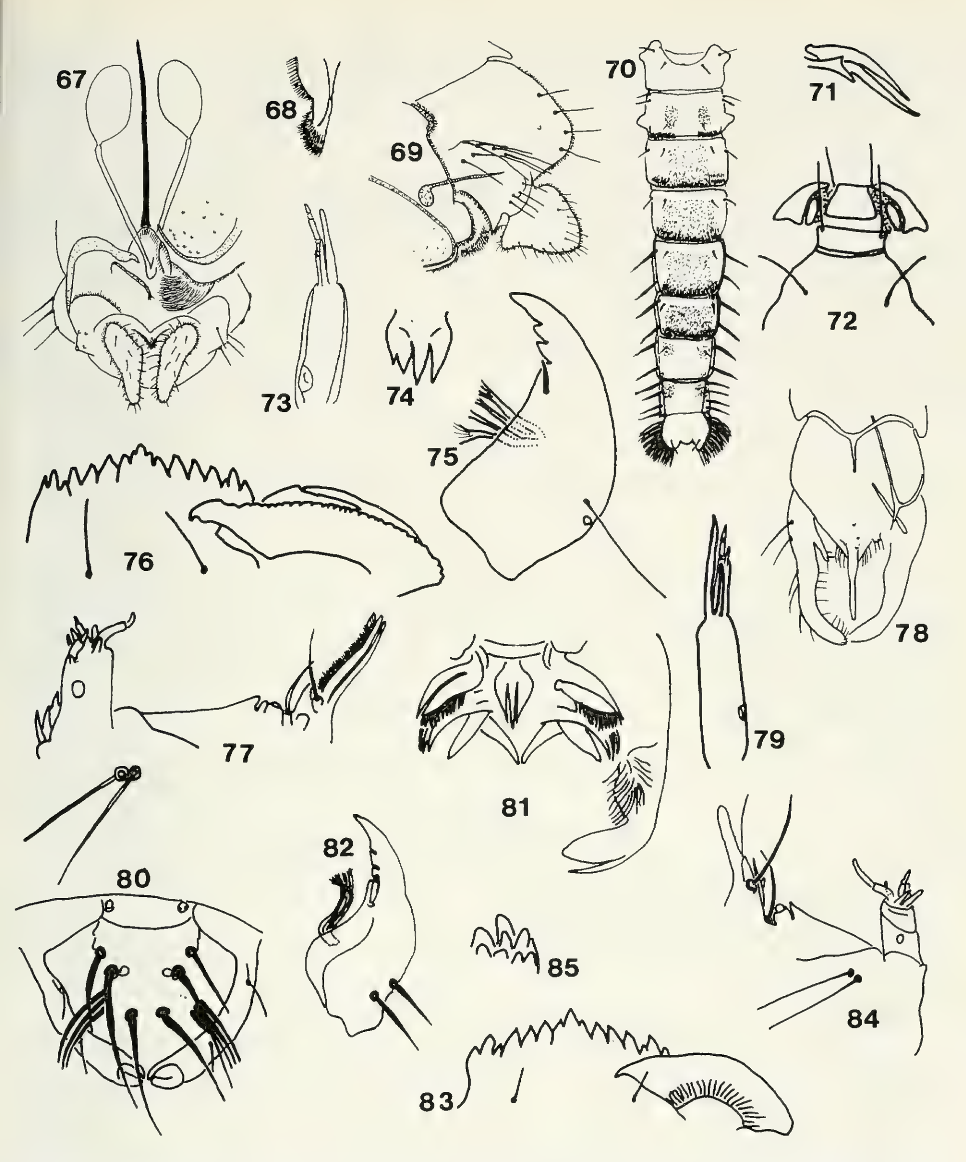
Wing. Setation: Brachiolum 3, R 14, R_1 6, R_{4+5} 14, squama about 30.

Leg. LR fore 1.3, mid 0.58, hind 0.64. Sensilla chaetica on tarsomere 1: midleg 35, hindleg nil.

Genitalia (Figs 67-69). Dorsomesal lobes of VIII comparatively small (Fig. 68). Ventrolateral lobes large (Fig. 67). Apodeme lobe small with a few microtrichia (Fig. 67, left). Gonocoxapodemes light brown, not joined. Coxosternapodemes large, light brown. Gonocoxite IX large but closely applied, with 5 setae (Fig. 69). Segment X with 4 setae per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules ovoid with short, narrow necks, 108 μm long, including neck, ducts almost straight with common opening.

Pupa (N = 2 mounted). Length 6.0-6.6 mm.

Cephalothorax. Dorsum finely granulose anteriorly, scutal tubercles small. Setation: Precorneals 2, antepronotals 1, dorsocentrals 4 in close pairs.



Figs 67-77. *Microchironomus deribae*. Adult: 67. ♀ genitalia, ventral. 68. Dorsomesal lobes. 69. ♀ genitalia, lateral. Pupa: 70. Abdomen, 71. Anal comb. Larva: 72. Dorsal surface of head capsule. 73. Antenna. 74. Pecten epipharynx. 75. Mandible. 76. Mentum. 77. Maxilla.
Fig. 78. *Microchironomus tener*. Hypopygium.
Figs 79-85. *Microchironomus*, Larva 1. 79. Antenna. 80. Labrum. 81. Pecten epipharynx and premandible. 82. Mandible. 83. Mentum. 84. Maxilla. 85. Chaetulae of palpiger.

Abdomen (Figs 70, 71). Tergite I bare; II with paired patches of shagreen; III-VI with large dorsal patch of shagreen; VII and VIII with paired anterior patches; tergites III-VI with posterior rows of spines. Hook row of II interrupted medially with gap about one third of row. Pedes spurii B on I and II,

small pedes spurii A on VI, and small spine patches posterolaterally on sternites V and VI. A row of spines anteriorly on sternite II. Segment VIII with small single or double posterolateral spines (Fig. 71). Setation as in Fig. 70. Segment I without L setae. II-IV with 2, V-VII with 3 lamelliform setae, VIII with 5. Anal fin with about 90 setae.

Larva (N = 6 mounted). Head capsule length about 455 µm.

Dorsal surface of head capsule (Fig. 72). Clypeus and frontal apotome separate.

Antenna (Fig. 73). 5 segments, basal segment longer than flagellum, with large ring organ in basal third. Blade reaching to about the base of terminal segment, accessory blade about half as long as blade. Lauterborn organs not developed, small style on segment 2.

Labrum. Similar to that illustrated by Pinder & Reiss (1983) for *M. tener*, but S I smaller in proportion to S II, and pecten epipharynx with 3 lobes (Fig. 74).

Mandible (Fig. 75). Dorsal tooth absent, length of apical tooth about equal to the combined lengths of the two inner teeth; all teeth dark brown. Seta subdentalis small and slender. Seta interna with 4 branches.

Mentum (Fig. 76). All teeth dark brown, median tooth trifid but central point notched laterally to form shoulders; 6 pairs of lateral teeth, fourth pair small, fifth and sixth pairs set forward. Ventromental plate slightly wider than mentum, dorsal margin crenate.

Maxilla (Fig. 77). Dorsal patch of leaf-like chaetulae of palpiger only partly visible in figure; one lacinal chaeta pectinate.

Body. Claws of anterior and posterior parapods simple. Anal tubules very short and blunt.

Specimens examined. Adults: Large numbers of ♂♂ and ♀♀, at lights, saline crater Lake Chitu, 83/2/4; ♂♂ and ♀♀, L. Langano, 83/3/14, 83/12/11; large numbers of ♂♂ and ♀♀, netted, L. Abijata, 83/5/29; ♂♂ and ♀♀ emerging from surface of L. Shala, 85/1/17. Larvae and pupae: Large numbers of larvae and two pupae, dredged from 5 m, L. Abijata 85/1/18; numerous larvae, dredged from 90 cm from L. Shala, 85/1/17.

Ecology. Larvae found in saline (soda) lakes at conductivities of 14 000-21 000 µS cm^{-1}. See Tudorancea & Harrison (1988), for details. Some adults were emerging from Lake Langano which was only slightly saline. Vareschi & Jacobs (1985) found them in the saline L. Nakuru, Kenya, and Cranston & Judd (1989) report them from from the soda/saline L. Van in eastern Turkey.

Distribution. Palaearctic region and northern part of Afrotropical region.

Microchironomus lendli Kieffer

Chironomus (Cryptochironomus) stilifer, Freeman 1957.
Microchironomus stilifer, Freeman & Cranston 1980.
Microchironomus lendli, Cranston & Judd 1989.

The male is described by Freeman 1954, 1957, and by Cranston & Judd 1989. Some further details are given here.

Adult male (N = 4 mounted). Wing length 1.4-1.5 mm.

Head. AR 1.6. Small frontal tubercles. Palp segments: 37, 34, 84, 115, 143 µm. No subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil-1, dorsocentrals 8, posterior prealars 4, scutellars 6 per side.

Wing. Setation: Brachiolum 2, R 4-6, R_1 nil, R_{4+5} nil, squama 8.

Leg. LR fore 1.7, mid 0.54, hind 0.62 µm. Sensilla chaetica on tarsomere 1: midleg 6-7, hindleg nil.

Hypopygium. Described by Freeman 1957, and Cranston & Judd 1989. The Ethiopian hypopygia are very similar, with inner basal expansion of gonostylus exaggerated, with elongated superior volsella about half the length of the gonostylus, and with setulose swelling about halfway along the long anal point, which is flanked by a pair of setulose projections.

Microchironomus tener Kieffer

Chironomus (Cryptochironomus) forcipatus, Freeman 1957.
Microchironomus tener, Cranston & Judd 1989.

Only males were collected.

Adult male (N = 2 mounted). Wing length 1.9 mm.

Head. AR 1.8. Frontal tubercles present. Palp segments: 46, 43, 102, 140, 158 µm; no subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 2, dorsocentrals 11 uniserial, posterior prealars 4, scutellars 2 per side.

Wing. Setation: Brachiolum 2, R 3, R_1 nil, R_{4+5} nil, squama 8.

Leg. LR fore 1.6, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil.

Hypopygium (Fig. 76). Anal tergite bands join with central extension about one third distance to anal point. Superior volsella narrow with 3 setae. Inferior volsella reduced (right of figure) with 3 setae.

Specimens examined. 2♂♂, netted, Lake Awasa, 84/5/27, 84/8/25.

Ecology. Appeared to be breeding in the lake, probably in weed beds.

Distribution. Palaearctic, Afrotropical, Oriental and Australopacific regions.

Microchironomus larvae

Three further larvae of *Microchironomus* were collected which differ from that of *M. deribae* in that their frontal apotome and clypeus are fused and that they have no pectinate lacinal chaeta on the maxilla.

Microchironomus larva 1

(N = 7 mounted). Colour. Head capsule yellowish. Body uniformly pale.

Head capsule length 325-390 µm.

Dorsal surface of Head. Clypeus and frontal apotome are fused.

Antenna (Fig. 79). Blade longer than segments 2-4, style well-developed.

Labrum (Figs 80, 81). SI and S II blade-like and about the same length, S III simple and long, S IV B?, peg-like. Labral lamella small. Pecten epipharynx (Fig. 81) with three pointed lobes. Premandible bifid with brush.

Mandible (Fig. 82). Teeth brown, no dorsal tooth, 2 flat inner teeth, seta subdentalis broad, seta interna with 4 plumose branches.

Mentum (Fig. 83). Teeth brown, median tooth pointed and trifid, 4th tooth smaller than 5th.

Maxilla (Figs 84, 85). Both paraxial and antaxial setae well-developed. No pectinate lacinal chaetae. Chaetulae of palpiger (Fig. 85) small and blunt.

Body. Claws of anterior parapod are thin, pointed and simple; those of posterior hook-shaped and simple. Anal setae and supraanal setae long. Anal tubules short and bluntly pointed.

Specimens examined. 1, Lake Awasa, 83/12/9; 2, L. Ziway, 1985; 4, L. Chamo, 84/9/29.

Ecology. The larva from Lake Awasa came from weed beds but those from L. Ziway and L. Chamo were dredged from the bottom at depths of 4-5 m and 7.5-10 m respectively.

Distribution. Ethiopian Rift Valley.

Microchironomus larva 2

(N = 8 mounted). Colour. Head capsule yellowish dorsally, mostly brown ventrally. Body yellowish.

Head capsule length 325 µm.

Dorsal surface of Head. Clypeus and frontal apotome are fused.

Antenna (Fig. 86). Blade well developed, reaching to base of segment 4. Style could not be discerned but there was some small structure near tip of segment 2.

Labrum (Fig. 87). Very similar to that illustrated by Pinder & Reiss (1983).

Mandible (Fig. 88). Very similar to that illustrated by Pinder & Reiss (1983).

Mentum (Fig. 89). Median tooth pointed and trifid; one specimen has a notch on one side. The 5th lateral tooth is larger than 4th and 6th and is set forward.

Maxilla (Fig. 90). Palp is moderately long but foreshortened in the figure as it tends to point ventrally. No a-seta; chaetulae of the palpiger are small. Paraxial seta long and points forwards; the antaxial seta absent.

Body. Claws of anterior parapods very fine and not serrate; those of posterior parapod hooklike and simple. Anal tubules short and pointed.

Specimens examined. 6 larvae, Lake Awasa, 1983; 2 larvae, L. Chamo, 84/9/29.

Ecology. Larvae from Lake Awasa were netted from weed beds. Those from L. Chamo were dredged from 7.5-10 m.

Distribution. Lakes of the Ethiopian Rift Valley.

Microchironomus larva 3

(N = 1 mounted). This larva is very similar to larva 2 in size and colour and most morphological details but differs as follows:

The pecten epipharynx (Fig. 91) is entire but is divided into three regions by two ridges; the mandible (Fig. 92) has a very small seta subdentalis; the ventromental plates of the mentum (Fig. 93) are pointed on both inner and outer surfaces and the posterior lacinal chaeta of the maxilla (Fig. 94) is much broader than in larva 2.

Specimen examined: 1, Lake Awasa, 1984.

Ecology. Netted from weed beds.

Comments on unassociated larvae. Larva 2 is very similar to that of *M. tener* as illustrated by Pinder and Reiss (1983) but this has the antennal blade longer than segments 2-4, and the ventromental plate of a different shape, more like those of larva 3. These small differences may be shown eventually to fall within the natural variation of this widely distributed species.

Larva 1 and the larva of of *M. deribae* both have the pecten epipharynx distally divided into 3 lobes, as reported for some species by Pinder & Reiss (1983). *M. deribae* differs from the others as it has one pectinate lacinal chaeta.

Larva 2 and larva 3 both have no antaxial seta on the maxilla.

Microtendipes lentiginosus Freeman

Microtendipes lentiginosus Freeman, 1957.

Only one female was collected but was easily identified by the characteristic pattern of spots on the wings.

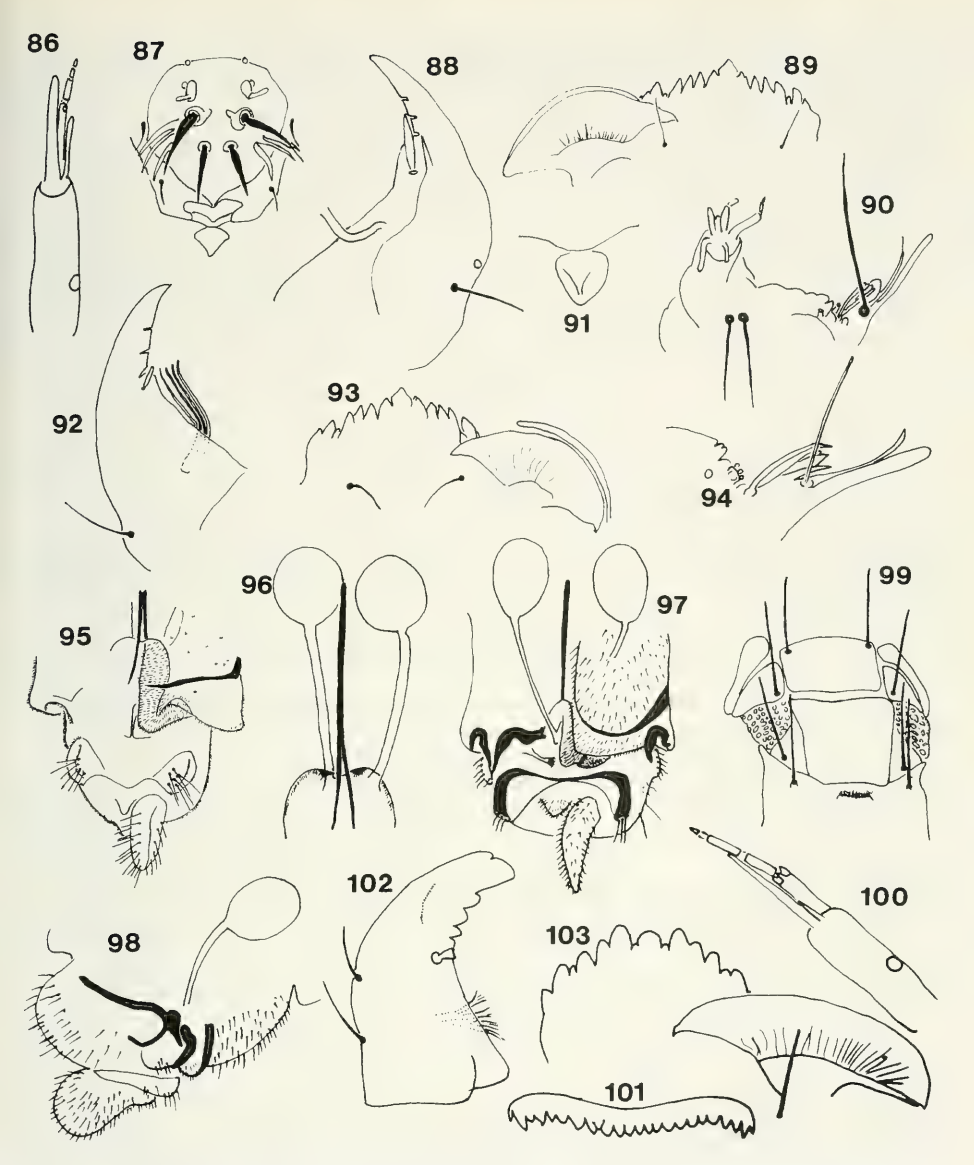
Freeman (1957) describes only the wing pattern of the holotype and paratype females, and implies that the male has a similar wing pattern. He says that this species is very similar to *M. albus* Goetghebuer, the male of which has the generically characteristic, proximally directed setae on the anterior femur, even if these are poorly developed. A more detailed description of a female is given here.

Adult female (N = 1). Wing length 2.9 mm.

Head. AR 0.4. No frontal tubercles. Palp segments: 77, 53, 155, 202, 285 µm. No subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals 2, dorsocentrals 18, posterior prealars 5, scutellars 12 per side partly biserial.

Wing. Shows the peculiar wing pattern as illustrated by Freeman 1957, "composed of numerous small rounded dark spots with blotches at the cross veins, posterior fork and apex". Setation: Brachio-



Figs 86-90. *Microchiromomus*, Larva 2. 86. Antenna. 87. Labrum. 88. Mandible. 89. Mentum. 90. Maxilla.
Figs 91-94. *Microchironomus*, Larva 3. 91. Pecten epipharynx. 92. Mandible. 93. Mentum. 94. Lacinal chaetae of maxilla.
Figs 95-96. *Microtendipes lentiginosus*. 95. ♀ genitalia, ventral. 96. Seminal capsules and spermathecal ducts.
Figs 97-103. *Nilodorum brevibucca*. Adult: 97. ♀ genitalia, ventral. 98. ♀ genitalia, lateral. Larva: 99. Dorsal surface of Head. 100. Antenna. 101. Pecten epipharynx. 102. Mandible. 103. Mentum.

lum 2, R 24, R_1 25, R_{4+5} 34, squama 11.

Leg. LR fore 1.1, mid 0.6, hind 0.8. Fore femur does not have two rows of proximally directed setae. Sensilla chaetica on tarsomere 1: midleg 8 on distal half, hindleg nil.

Genitalia (Figs 95, 96). Gonopophysis VIII simple with strong microtrichia. Gonocoxapodeme strong and dark, posterior part straight, ending on gonopophysis VIII; apodeme lobe not discernible. Tergite IX with small rounded caudal projection. Coxosternapodeme rudimentary (Fig. 95, left). Gonocoxite IX reduced to a low bulge with no setae. Segment X normal with 6 setae per side, postgenital plate roundly pointed, cerci about 121 µm. Seminal capsules small and spherical, 68 µm, spermathecal ducts straight (Fig. 96); appear to widen distally but the ends could not be discerned.

Pupa and Larva. The immatures are described from Ghana by Amakye & Saether (1992)

Specimen examined. One ♀, trapped alongside a pond near Dinsha, Bale Mountains at 3200 m, 84/10/20 (coll. Dr. Hillman).

Comments. Gonocoxite IX and the coxosternapodeme are both rudimentary; in two other species illustrated by Saether (1977) these are similarly very small or rudimentary.

Ecology. Appears to breed in standing water.

Distribution: Ethiopia, Kenya, Zaire, Natal, South Africa.

Nilodorum brevibucca Kieffer

Chironomus (*Nilodorum*) *brevibucca*, Freeman 1957; Dejoux 1970a.
Nilodorum brevibucca, Freeman & Cranston 1980.

Freeman (1957) describes the male and, briefly, the female. Dejoux (1970a) describes in detail the male hypopygium and the pupa. Extra details of the male, and a description of the female and the larva are given here.

Adult male (N = 1 mounted). Wing length 4.0 mm.
Head. AR 5.7. Frontal tubercles absent. 4 or 5 subapical sensilla on palp segment 3. Palp very short, segments: 56, 53, 109, 83, 31 µm.
Thorax. Small scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 25 partly biserial, posterior prealars 7, scutellars 10 or 11, mostly biserial.
Wing. Setation: Brachiolum 3, R 6-7, R_1 nil, R_{4+5} nil, squama 26.
Leg. LR fore 1.2, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg 33, hindleg 13.
Hypopygium. Very similar to Dejoux (1970a), but his description and that of Freeman (1956) do not show the strong anal tergite bands that join centrally to form a narrow V with a short posterior extension.

Adult female (N = 3 mounted). Saether (1977) does not define *Nilodorum* (s. str.).
Wing length 4.2 mm.
Head. AR 0.4. No frontal tubercles. 4 or 5 subapical sensilla on palp segment 3. Palp very short, segments: 81, 40, 76, 65, 71 µm.
Thorax. Small scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 23, posterior prelars 8, scutellars 11 or 12 per side biserial.
Wing. Setation: Brachiolum 3, R 14, R_1 3 or 4 towards tip, R_{4+5} 9-10 towards tip, squama about 30.
Leg. LR fore 1.3, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg about 112 biserial, hindleg about 60 mostly uniserial.
Genitalia (Figs 97, 98). Tergite VIII strongly chitinized and brown, also obvious in unmounted specimens; strong ventral ridges bearing setae (Fig. 97, right). Gonocoxapodemes rounded caudally not joined. Gonopophysis VIII divided into large dorsomedial lobe and smaller ventrolateral lobe. Apodeme lobe well developed with microtrichia (Fig. 97, left). Coxosternapodeme dark and curved. Gonocoxite IX closely applied, 6 or 7 setae. Segment X with strongly chitinized and brown portion antero-laterally (Figs 97, 98) and with 7 to 8 setae per side. Postgential plate triangular, cerci normal. Labium without microtrichia. Seminal capsules ovoid, 155 µm long, ducts almost straight, glandular for full length and with common opening.

Pupa (N = 1 mounted). The pupa is described in detail by Dejoux (1970a) and by Pinder & Reiss (1986). The Ethiopian pupa was very similar with a narrow hook row anterior on tergite II and the anal combs consisting of 8 short teeth with window-like pits at the base. Segment I with 1 L seta, II-IV with 3, V-VIII with 4 lamelliform L setae. Anal fin with about 250 setae.

Larva (N = 12 mounted). Head capsule length 780-845 µm.

Dorsal surface of head (Fig. 99). Anterior margin of frontal apotome concave, but convex in centre anterior to reticulated pit. Labial sclerites 1 and 2 present. Similar to *N. rugosum* (Pinder & Reiss 1983).

Antenna (Fig. 100). With 5 segments, ring organ in proximal third of basal segment. Blade reaching to 4th antennal segment. Lauterborn organs well-developed, style small, on second antennal segment.

Labrum. Similar to that of *N. rugosum* (Pinder & Reiss 1983) but pecten epipharynx not so convex (Fig. 101) and teeth rather short; may be result of wear as in some specimens the teeth were almost worn away. Premandible with 7 teeth.

Mandible (Fig. 102). dorsal tooth pale, the others dark with 4th somewhat lighter. Seta subdentalis short and broad and with irregular fine teeth; in some specimens it was somewhat longer with distal end rounded and no obvious teeth; may be result of wear. Dorsal pecten mandibularis with long teeth, only bases of these indicated in Fig. 102.

Mentum (Fig. 103). Median tooth trifid, first lateral tooth higher than median, and 4th lateral tooth lower than 5th. Ventromental plates with about 100 striae.

Maxilla. Similar to that of *Kiefferulus chloronotus* (Fig. 58).

Body. One pair of short ventral tubules; anal tubules with blunt rounded tips, shorter than parapods; anterior and posterior claws simple.

Specimens examined. Adults: numerous ♂♂ and ♀♀, at lights, Lake Ziway, 81/4/15, 82/12/31; 1♂, at lights, L. Awasa 83/6/31, 1♂ and 1♀, netted, L. Awasa, 84/2/11; a few ♂♂ and ♀♀, at lights, L. Langano, 83/3/14. Pupae and larvae: 1 pupa, Hora Kela Shet, outflow of Lake Langano, 84/2/24. Numerous larvae, Hora Kela Shet, 84/2/24.

Ecology. The only larvae captured were from aquatic weeds on muddy bottom of a slow-flowing river. The numerous adults from Lake Ziway must have come from larvae living in the swampy shallows around the lake; they were not found on the bottom of the open lake (Tudorancea et al. 1989). Dejoux (1983) found the larvae among aquatic weed and *Cyperus papyrus* in L. Chad. The mouthparts of the Ethiopian larvae were all moderately to badly worn indicating that the larvae were ingesting sand particles.

Distribution. Most of Afrotropical Region as far south as Natal, Israel (Laville & Reiss 1993).

Nilodorum brevipalpis Kieffer

Chironomus (Nilodorum) brevipalpis, Freeman 1975; Dejoux 1970a.
Nilodorum brevipalpis, Freeman & Cranston 1980.

Freeman (1957) describes the male and Dejoux (1970a) gives a detailed description of the male hypopygium and of the pupa. Further details of the male, and descriptions of the female and larva are given here.

Adult male (N = 4 mounted). Wing length 3.1-3.2 mm.

Head. AR 3.5-3.6. Minute frontal tubercles. 4 subapical sensilla on palp segment 3. Palp very short, segments: 47, 47, 80, 78, 62 µm.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 12, posterior prealars 9, scutellars 8 per side.

Wing. Setation: Brachiolum 3, R 6-8, R_1 nil, R_{4+5} nil, squama 26.

Leg. LR fore 1.3, mid 0.45, hind 0.52. Sensilla chaetica on tarsomere 1: midleg 16, hindleg 8.

Hypopygium. Dejoux's (1970a) description is detailed but he does not show that the strong anal tergite bands meet to form a broad V, with a long extension almost to base of anal point.

Adult female (N = 3 mounted). Wing length 3.2 mm.

Head. AR 0.5. Minute frontal tubercles. Palp segment 3 with 4 subapical sensilla. Palp very short, segments: 47, 43, 56, 65, 56 µm.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 13, posterior prealars 11, scutellars 6 per side.

Wing. Setation: Brachiolum 3, R 18-22, R_1 20-25, R_{4+5} 10-18 near tip, squama about 30.

Leg. LR fore 1.4, mid 0.4, hind 0.5. Sensilla chaetica on tarsomere 1: midleg 46 biserial, hindleg 37 partly biserial.

Genitalia (Figs 104, 105). Tergite VIII not strongly chitinized; strong ventral ridges bearing a few setae (Fig. 104, right). Gonocoxapodemes rounded laterally, not joined. Gonopophysis VIII divided into large dorsomedial lobe and smaller ventrolateral lobe. Apodeme lobe well-developed (Fig. 104, left). Coxosternapodeme dark and curved. Gonocoxite IX small and closely applied with no setae (Fig. 105) or one seta (Fig. 104, left). Segment X with strongly chitinized portion anterolaterally, with 9-14 setae per side. Postgenital plate triangular, cerci normal. Labium without microtrichia. Seminal capsules ovoid, 140 µm long, ducts almost straight, glandular for full length and with common opening (Fig. 106).

Pupa. No pupae were collected, but Dejoux (1970a) gives a full description. The anal combs on segment VIII are reduced to scales borne on well-differentiated pads, not strongly chitinized.

Larva (N = 6 mounted). Head capsule length 650-715 µm.

Dorsal surface of Head. Similar to *N. brevibucca*, anterior margin of frontal apotome concave, but somewhat flattened anterior to the reticulated pit which is not as well developed as in *brevibucca*.

Antenna. Similar to *brevibucca*. Blade reaching to about the centre of antennal segment 4.

Labrum. Similar to *N. rugosum* (Pinder & Reiss 1983) and *brevibucca*; premandible with 7 teeth, pecten epipharynx with teeth longer than *brevibucca*, probably because they were not worn.

Mandible (Fig. 107). Dorsal and 4th interior tooth light, the rest dark; seta subdentalis widening distally with small teeth. Pecten mandibularis with long teeth.

Mentum (Fig. 108). Central tooth notched laterally, Ventromental plates with about 50 striae.

Maxilla. Similar to that of *Kiefferulus chloronotus* (Fig. 58).

Body. One pair of short ventral tubules; anal tubules shorter than parapods, with blunt rounded tips and slighly narrower at their bases. Anterior and posterior claws simple.

Specimens examined. Adults: Numerous ♂♂ and ♀♀, at lights, Lake Ziway, 81/4/15, 82/12/31; numerous ♂♂ and ♀♀, at lights L. Awasa, 81/4/15, 83/1/31; 1♂, netted, L. Awasa, 84/2/11; a few ♂♂ and ♀♀, at lights, L. Langano, 83/3/14. Numerous larvae collected in L. Awasa 1983-84, and L. Ziway 1984-85 (C.Tudorancea).

Ecology. The larvae from Lake Awasa were collected from the marginal weed beds and from the lake bottom near the weed beds (Tilahun Kibret & Harrison, 1989); those from Lake Ziway from the shallow lake bottom (Tudorancea et al. 1989).

Distribution. Most of Afrotropical region as far south as Zimbabwe and Namibia, also known from Lower Egypt (coll. ZSM unpubl.).

Parachironomus acutus Goetghebuer

Chironomus (Cryptochironomus) acutus, Freeman 1957.
Parachironomus acutus, Hare & Carter 1987.

Males only were collected.

Adult Male (N = 2 mounted). Similar to generic definition.

Wing length. 1.9-2.1 mm.

Head. AR 1.9. Small frontal tubercles. Tentorium similar to that of *Parachironomus* sp. of Cranston et al. (1989). Palp segments: 31, 25, 109, 133, 202 µm, one subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 5-6, dorsocentrals 13-14 uniserial, posterior prealars 7, scutellars 6 per side.

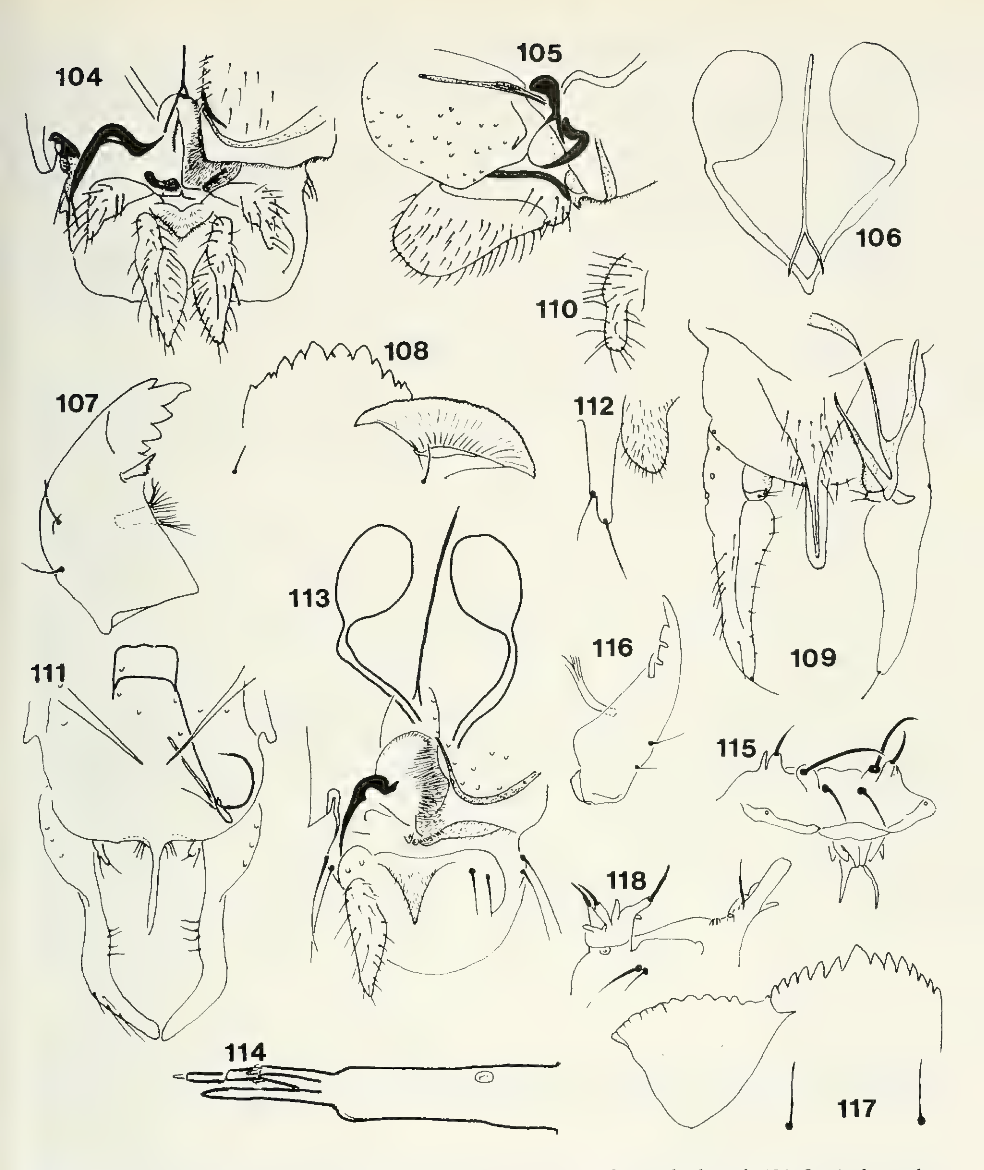
Wing. Setation: Brachiolum 2, R 26, R_1 18, R_{4+5} 28, squama 7.

Leg. LR fore 1.6, mid 0.6, hind 0.6. Sensilla chaetica on tarsomere 1: midleg 13, hindleg nil.

Hypopygium (Figs 109, 110). Anal tergite bands narrow, not joining centrally. Anal tergite setae not divided into median and apical patches. Anal point long but broader than in other species. Superior volsella small, pointing medially, with 2 setae. Inferior volsella reduced to microtrichous lobe with ventral process (Fig. 110). Gonostylus broad at base and fused with gonocoxite.

Specimens examined. 3♂♂, at lights, Lake Awasa, 81/4/15; numerous ♂♂, fish harbour, L. Awasa, 84/2/11; 2♂♂, fish harbour, L. Awasa, 84/5/27.

Comments. Hare & Carter (1987) reared this species from the larval stage confirming its generic placement.



Figs 104-108. *Nilodorum brevipalpis*. Adult. 104. ♀ genitalia, ventral. 105. ♀ genitalia, lateral. 106. Seminal capsules, ducts. Larva: 107. Mandible. 108. Mentum.
Figs 109-110. *Parachironomus acutus*. 109. Hypopygium. 110. Inferior volsella, ventral.
Figs 111-113. *Parachironomus dewulfianus*. 111. Hypopygium. 112. Superior and inferior volsellae. 113. ♀ genitalia, ventral.
Figs 114-118. *Parachironomus*, Larva A. 114. Antenna. 115. Labrum. 116. Mandible. 117. Mentum. 118. Maxilla.

Ecology. Breeds in lakes.

Distribution. Most of Afro-tropical region, Turkey and Egypt (Laville & Reiss 1993).

Parachironomus dewulfianus Goetghebuer

Chironomus (*Cryptochironomus*) *dewulfianus*, Freeman 1957.
Parachironomus dewulfianus, Freeman & Cranston 1980.

Males of this species and of *P. acutus*, and two different females of this genus were netted together. The female without frontal tubercles is described here as the probable female of *P. dewulfianus*. The male is described by Freeman (1957) but a more detailed description is given here.

Adult male (N = 3 mounted). Wing length 2.0-2.1 mm.

Head. AR 2.0. No frontal tubercles. Palp segments: 47, 37, 127, 140, 236 µm. No subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 3-4, dorsocentrals 20 partly biserial, posterior prealars 5, scutellars 8.

Wing. Setation: Brachiolum 3, R 30, R_1 18, R_{4+5} 31, squama 9.

Leg. LR fore 1.6, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 9, hindleg nil.

Hypopygium (Figs 111, 112). Anal tergite bands not meeting in centre. Anal point long and slender. Superior volsella small with two setae, one subterminal. Inferior volsella membranous with microtrichia. Gonostyli bent.

Adult female (probable) (N = 1). Wing length 2.0 mm.

Head. AR 0.47. No frontal tubercles. Palp segments: 47, 37, 124, 130, 208 µm. No subapical sensilla on segment 3.

Thorax. Scutal tubercle present. Setation: Lateral antepronotals 4, dorsocentrals 28 partly biserial, posterior prealars 6, scutellars 8 per side.

Wing. Setation: Brachiolum 2, R 22, R_1 21, R_{4+5} 44, squama 8.

Leg. LR fore, tarsus missing, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 20, hindleg nil.

Genitalia (Fig. 113). Sternite VIII with small ventral ridges. Dorsomesal lobe large with long oromesal microtrichia. Ventrolateral lobe smaller. Apodeme lobe (Fig. 113, left) weak, no microtrichia visible. Gonocoxapodemes narrow, not joined. Coxosternapodemes dark and curved. Gonocoxite IX closely applied with 2 setae. Segment X with 2 setae per side, postgenital plate pointed. Labia with microtrichia. Seminal capsules ovoid, about 78 µm long, with narrow necks, ducts slightly curved, with common opening. Cerci normal.

Specimens examined. 1♂, at lights, Lake Awasa, 83/12/10; numerous ♂♂, L. Awasa, 84/2/11; 2♂♂, L. Awasa, 84/5/27; 1 probable ♀, L. Awasa, 84/2/11. 2♂♂ L. Abaya, 84/2/26.

Ecology. Adults were emerging from the lake.

Distribution. Afrotropical region as far south as Zimbabwe, Algeria and Egypt (Laville & Reiss 1993).

Parachironomus, Larva A

This larva was collected from Lake Awasa near where the two species of male adults were netted, but it cannot be associated with either of them.

Larva (N = 1 mounted). Similar to generic definition.

Head capsule length 0.33 mm.

Body length 4.4mm. Dorsal surface of head: Anterior edge of frontal apotome convex.

Antenna (Fig. 114). 5-segmented, basal segment longer than flagellum. Blade reaches to middle of segment 4. Small style and small Lauterborn organs at tip of segment 2.

Labrum (Fig. 115). S I blade-like and smaller than S II. Pecten epipharynx a wide plate with 4 teeth. Premandible (not illustrated) with 2 broad teeth and no brush.

Mandible (Fig. 116). No dorsal tooth. Apical tooth long with 2 inner teeth. Seta subdentalis short; seta interna with 4 branches.

Mentum (Fig. 117). Median tooth simple, 7 pairs of lateral teeth, light brown in colour. Anterior margin of ventromental plates strongly scalloped.

Maxilla (Fig. 118). Palp short, no a-seta, setae maxillaris unequal. Antaxial seta present but paraxial seta absent.

Body. Anterior and posterior claws simple. Anal tubules short and broad with rounded or broadly tapered tips.

Specimens examined. Two larvae, weed beds, Lake Awasa during survey 1983-84, coll. Tilahun Kibret & Harrison (1989).

Comments. According to key in Pinder & Reiss (1983) these larvae belong to *arcuatus*-group.

Ecology. Lake weed beds.

Distribution. Ethiopian Rift Valley.

Paratendipes striatus Kieffer

Paratendipes striatus, Freeman 1957.

One female only was collected.

Adult female (N = 1 mounted). Close to generic definition.

Wing length 2.0 mm.

Head. AR 0.44. No frontal tubercles. Palps short, segments: 62, 50, 115, 102, 171 µm. 2 subapical sensory setae on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 13, posterior prealars 3, scutellars 4.

Wing. Colour pattern similar to male (Freeman 1957): "vague clouding in form of seams along the veins, cell r_5 with a faint quadrate spot near centre and a smaller rounded one below the apex of R_{4+5}". Setation: Brachiolum 2 or 3, R 16, R_1 8, R_{4+5} 19, squama 10.

Leg. LR fore, tarsi missing, mid 0.75, hind 0.67. Markings as in male (Freeman 1957). Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil.

Genitalia (Figs 119, 120). Gonopophysis VIII simple, not divided into dorsomesal and ventrolateral lobes. Apodeme lobe (Fig. 119, left) very weak, no obvious microtrichia. Gonocoxapodemes strong, joining mesally. Coxosternapodeme strong and curved. Gonocoxite IX small with 2 setae. Segment X with no setae. Postgenital plate appears to be folded dorsally and there is an undetermined internal structure dorsal to plate. Labia without microtrichia. Seminal capsules (Fig. 120) ovoid with neck, 65 µm long without neck, ducts almost straight, joining to common opening.

Specimen examined. 1♀, at lights, Amibara Irrigation Project, Middle Awash River, 800 m, 84/11/10.

Ecology. Appeared to be breeding in irrigation canals.

Distribution. Egypt, Sudan, and Ethiopian Rift Valley at lower altitude.

Polypedilum (Pentapedilum) vittatum Freeman

Polypedilum (*Pentapedilum*) *vittatum* Freeman, 1958.

One male only was collected. Freeman points out that this species is easily distinguished from other similar species by the broad bands basally on the abdominal segments. He does not illustrate the hypopygium.

Adult male (N = 1). Wing length 2.5 mm.

Colour. As in Freeman (1958).

Head. AR (antennae missing) Freeman gives 1.7-2.0. No frontal tubercles. Palp segments: 37, 53, 202, 155, 223 µm. 4 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 14 uniserial, posterior prealars 5, scutellars 4 per side.

Wing. Anal lobe moderately developed, setae evenly distributed over wing membrane but not dense. Setation of veins: Brachiolum 1, R 34, R_1 36, R_{4+5} 66, M 8, cross vein 1, squama 14.

Leg. LR fore missing (Freeman gives 1.5), mid 0.5, hind 0.8. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil.

Hypopygium (Fig. 121). Anal tergite bands fused basally but continue posteriorly on either side of field of anal tergite setae; these are separate from the apical setae. Tergite IX tapered, anal point narrow. Superior volsella simple, gently curved with one seta. Inferior volsella with apical seta on distinct process.

Specimen examined. 1♂, at lights, Addis Ababa, 83/10.

Ecology. Not fully known; seems to occur at higher altitudes in the tropics. In Zimbabwe they were breeding in a marsh near Harare (coll. ADH, 62/5/3).

Distribution. Ethiopian Highlands, Zimbabwe, Uganda.

Polypedilum (Pentapedilum) wittei Freeman

Polypedilum (*Pentapedilum*) *wittei* Freeman, 1958; Cranston & Judd 1989.

One male only was collected. Freeman (1958) shows that this species can be distinguished from other similar species by the narrow dark bands at the apices of the abdominal segments. He shows the hypopygium, but it is illustrated in more detail here.

Adult male (N = 1). Wing length 2.2 mm.

Colour. As in Freeman (1958).

Head. AR 2.2. Minute frontal tubercles. Palp segments: 47, 40, 152, 148, 236 µm. 2 or 4 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 26 partly biserial, posterior prealars 5, scutellars 17 per side partly biserial.

Wing. Anal lobe moderate, setae fairly evenly distributed over wing membrane. Setation on veins: Brachiolum 2, R 50, R_1 38, R_{4+5} 70, M 12, cross vein nil, squama 10.

Leg. LR fore missing, Freeman gives 2.0, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil. Hypopygium (Fig. 122). Anal tergite bands fused basally to form a point mesally, and continue posteriorly on either side of field of anal tergite setae. These are separate from weak apical setae. Anal point narrow. Superior volsella sharply bent with two lateral setae and 3 medial basal setae. Inferior volsella with apical seta on indistinct process.

Specimen examined. 1♂, at lights, Lake Langano, 83/12/11.

Comments. This species differs from *P.* (*Pent.*) *vittatum* in the arrangement of the abdominal bands but also in its larger number of dorsocentral setae (26 vs. 14) and scutellars (17 per side vs. 4) on the thorax, and the larger number of setae on the veins of the wings. There are small differences in the hypopygial structure, notably of the superior volsella. Cranston & Judd illustrate only one lateral seta on the superior volsella.

Ecology. Breeds in standing waters of various sizes. In Zimbabwe it breeds in pools in rivers and streams and in small impoundments (coll. ADH 1962).

Distribution. Most of Afrotropical Region as far south as the Transvaal, and in the Arabian Peninsula, Greece and Syria (Laville & Reiss 1993).

Polypedilum (Polypedilum) abyssiniae Kieffer

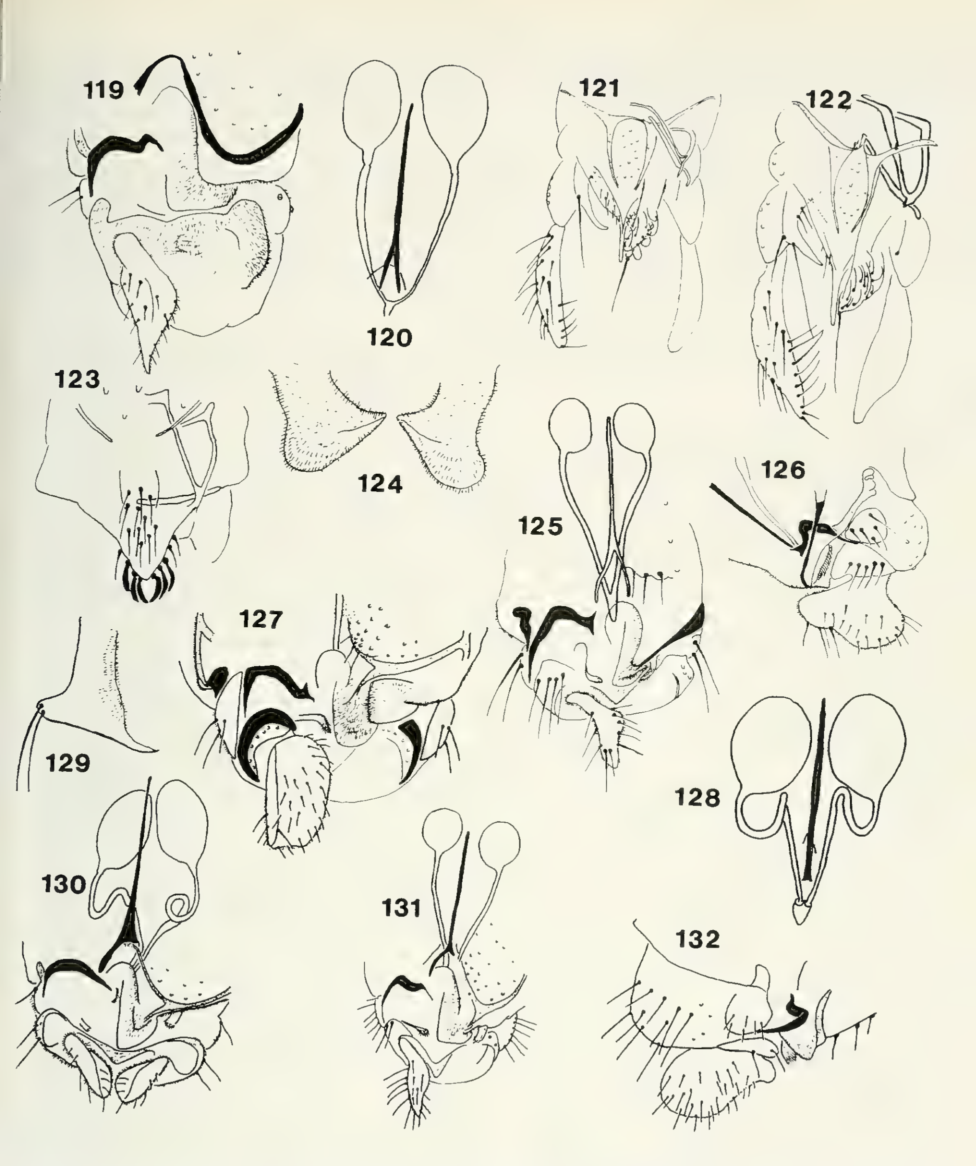
Polypedilum (*Polypedilum*) *abyssiniae*, Freeman 1958.

Freeman describes the male, and the female wing.

Adult male (N = 3 mounted). Differs from generic definition in structure of anal point and superior volsella.

Wing length 1.6 mm.

Colour. As in Freeman (1958), "a small dark species with patterned wings ". Ethiopian specimens have the same wing pattern as shown in Freeman's photograph, distinguished from similar species by the two markings only in cell r_5, and no marking on or near the cross vein. There is a discrete mark well basal to the cross vein.



Figs 119-120. *Paratendipes striatus*. 119. ♀ genitalia, ventral. 120. Seminal capsules, ducts.
Fig. 121. *Polypedilum (Pentapedilum) vittatum*. Hypopygium. Fig. 122. *Polypedilum (Pentopedilum) wittei*. Hypopygium.
Figs 123-126. *Polypedilum (Polypedilum) abyssiniae*. 123. Hypopygium. 124. Superior volsella. 125. ♀ genitalia. ventral. 126. ♀ genitalia, lateral.
Figs 127-128. *Polypedilum (Polypedilum) alticola*. 127. ♀ genitalia, ventral. 128. Seminal capsules, ducts.
Figs 129-130. *Polypedilum (Polypedilum) annulatus*. 129. Superior volsella. 130. ♀ genitalia, ventral.
Figs 131-132. *Polypedilum (Polypedilum) deletum*. 131. ♀ genitalia, ventral. 132. ♀ genitalia, lateral.

Head. AR 1.12. Frontal tubercle present. Palp segments: 40, 37, 93, 108, 186 µm. 2 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 10 uniserial, posterior prealars 4, scutellars 3 per side.

Wing. Setation: Brachiolum 1, R 16, R_1 14, R_{4+5} 16, squama 4.

Leg. LR fore 1.9, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: mid leg 2 at tip, hind leg nil.

Hypopygium (Figs 123, 124). Anal tergite bands not fused. Anal point broad, conical and fringed with 3 or 4 pairs of flattened spines. Superior volsella (Fig. 124) broad, membranous, covered with microtrichia rather difficult to see, but with no setae; almost meet medially under the anal point. Inferior volsella and gonocoxite normal for the genus.

Adult female (N = 5 mounted). Wing length 1.7 mm.

Colour. Similar to male, wing pattern darker.

Head. AR 0.4. Frontal tubercles present. Palp segments: 43, 40, 96, 102, 174 µm. 3 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorscentrals 11, posterior prealars 4, scutellars 5 per side.

Wing. Setation: Brachiolum 1, R 22, R_1 18, R_{4+5} 28, squama 4.

Leg. LR fore 1.9, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: mid leg 4 at tip, hind leg nil.

Genitalia (Figs 125, 126). Ventral ridges on sternite VIII strong and transverse, bearing 2 or 3 setae. Dorsomesal lobe large, posterior end bending dorsally. Ventrolateral lobe small. Apodeme lobe (Fig. 125, left) small, bearing microtrichia. Gonocoxapodemes dark, straight and ending on dorsomesal lobe, not joined. Coxosterapodemes dark and curved. Gonocoxite IX with 5 setae (Fig. 126). Segment X with 5 setae per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules small, almost spherical, length 47 µm, ducts almost straight with common opening.

Pupa and larva. Unknown.

Specimens examined. Adults: Numerous ♂♂ and ♀♀, at lights, Lake Awasa, 81/4/15, 83/1/31; similarly, L. Langano, 83/3/14.

Comments. This species is atypical for the genus in the structure of the anal point and superior volsella of the male, and in the transverse ventral ridge on sternite VIII and the structure of the gonocoxapodeme in the female. If larva type E belongs to this species then it also has an atypical larva. Unfortunately no pupa is available.

Ecology. Breeding in shallow lakes and slow-flowing rivers.

Distribution. Afrotropical Region as far south as the Transvaal, South Africa.

Polypedilum (Polypedilum) albosignatum Kieffer

Polypedilum (Polypedilum) albosignatum, Freeman 1958.

One male only was collected. Freeman describes the male but more details are given here.

Adult male (N = 1 mounted). Wing length 2.1 mm.

Colour. A dark fly with strongly marked wings. The Ethiopian specimen has the same wing markings as shown in Freeman's photograph: cell r_5 is nearly all dark with two light patches marking off the large central spot; cell m_{1+2} is all dark except for a light subterminal patch; m_{3+4} and the anal cell both have a large dark spot and a dark band along the edge of the wing.

Head. AR 1.8. Minute frontal tubercles. Palp segments: 37, 62, 133, 149, 248 µm. 3 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 20 partly biserial, posterior prealars 6, scutellars 14 per side biserial.

Wing. Setation: Brachiolum 1, R 24, R_1 23, R_{4+5} 43, M 1, cross vein 1, squama 10.

Leg. LR only hind present 0.4, Freeman gives 2.0 for fore. Sensilla chaetica on tarsomere 1: mid leg missing, hind leg nil.

Hypopygium. As illustrated by Freeman, and as follows. Anal point broad and strongly downturned, 20 anal tergite setae. Superior volsella very short, 3 megasetae. Inferior volsella long and thin, 4 terminal megasetae (Freeman shows 5). Gonostylus long, thin.

Specimen examined. 1♂, at lights, Lake Abaya, 84/2/26.

Ecology. Appears to breed in large rivers (Nile) and lakes at lower altitudes.

Distribution. Egypt, Sudan, Ethiopia, Uganda.

Polypedilum (Polypedilum) alticola Kieffer

Polypedilum (Polypedilum) alticola, Freeman 1958; Cranston & Judd 1989.

The above authors describe the male; further details of the male are given here, and the female is described.

Adult Male (N = 1 mounted). Wing length 2.8 mm.

Colour. Freeman describes the colour and illustrates the wing pattern. A large dark species with strongly marked wings; these have two dark spots on cell r_{4+5}, the larger spot reaching up to the cross vein; lighter spots in the other cells. Clouding along the veins.

Head. AR 1.4. Small frontal tubercles. Palp segments: 62, 62, 202, 186, 310 µm. 8 very small subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 25 partly biserial, posterior prealars 8, scutellars 12 per side biserial.

Wing. Setation: Brachiolum 1, R 29, R_1 25, R_{4+5} 40, squama 15.

Leg. LR (fore missing, Freeman gives 1.4), mid 0.4, hind 0.8. Sensilla chaetica on tarsomere 1: midleg 3, hindleg nil.

Hypopygium. Similar to descriptions by Freeman, and Cranston & Judd. Anal tergite bands moderately developed, somewhat transverse but not fused. 8 median anal tergite setae. Anal point narrow. Superior volsella narrow and almost straight as in Freeman. Inferior volsella narrow. Gonocoxites very broad.

Adult female (N = 1 mounted). Fits Saether's (1977) rather broad generic definition.

Wing length 3.4 mm.

Colour. Similar to male but wing pattern somewhat darker.

Head. AR 0.3. No frontal tubercles. Palps missing.

Thorax. Small scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 30 partly biserial, posterior prealars 8, scutellars 15 per side biserial.

Wing. Setation: Brachiolum 1, R 33, R_1 41, R_{4+5} 70, M 20, cross vein 2, squama 15.

Leg. LR fore 1.4, mid 0.5 hind 0.8. Sensilla chaetica on tarsomere 1: mid leg 22, hind leg nil.

Genitalia (Figs. 127, 128). Sternite VIII strongly chitinized and brown; anterior edge of X strongly chitinized. Small ventral ridge in sternite VIII with 3 setae. Dorsomesal lobes large and extending above the edge of X. Ventrolateral lobes large. Apodeme lobe (Fig. 127, left) fairly large and bearing microtrichia. Gonocoxapodemes light brown, with branch onto dorsomesal lobe, main branches joined. Coxosternapodemes dark and curved. Gonocoxite IX chitinized with 3 setae. Segment X with 6 or 7 setae per side, postgenital plate rounded (not in figure). Labia without microtrichia. Seminal capsules ovoid, 102 µm long, ducts with S-bend and common opening (Fig. 128).

Pupa and larva. Unknown.

Specimens examined. Adults: 1♀, Ashilo River, ET 27, 84/1/24; 1♀, Abo River, ET 2, 84/10/11; 1♂, at lights, Addis Ababa, 85/4.

Comments. The S-bend in the spermathecal ducts of the female seems to be characteristic of this species.

Ecology. Breeds in torrential mountain streams and rivers.

Distribution. Widespread in Afrotropical and Oriental regions (Cranston & Judd 1989).

Polypedilum (Polypedilum) annulatum Freeman

Polypedilum (Polypedilum) annulatum Freeman, 1958.

This species is very similar to *P. (Poly.) kibatiense* Goetghebuer (Freeman 1958) but can be distinguished by its colour: abdomen is ringed, each segment having a pale apical band occupying about one-third of the segment. The Ethiopian male was like this before it faded in spirit. Both species have plain wings.

A female collected with the male is similar in size and general colouration, and is described here as the probable female of this species. Both specimens were rather fragile and had lost some of their appendages.

Adult male (N = 1 mounted). Wing length 1.9 mm.

Head. Antennae missing. No frontal setae. Palps missing.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 13, posterior prealars 5, scutellars 4.

Wing. Condition too poor for accurate setal count.

Leg. Tibia and tarsus missing.

Hypopygium (Fig. 129). Similar to that of Freeman (1958) but superior volsella has more of a "heel".

Adult female (N = 1 mounted). Fits Saether's broad generic definition.

Wing length 1.9 mm.

Head. Antennae and palps missing. No frontal tubercles.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 12, posterior prealars 4, scutellars 4 per side.

Wing. Condition too poor for accurate setal count.

Leg. Poor condition.

Genitalia (Fig. 130). No ventral ridge on sternite VIII. Dorsomesal lobe large. Ventrolateral lobe small. Apodeme lobe (Fig. 130, left) small with microtrichia. Gonocoxapodemes light brown with branch onto dorsomesal lobe, joined centrally. Coxosternapodemes dark and curved. Gonocoxite IX small with 1 seta. Segment X with 2 setae per side. Post genital plate broadly triangular. Labia without microtrichia. Cerci small, shorter than seminal capsules. Seminal capsules ovoid with small necks, 71 µm long without neck, ducts looped, appear to have common opening.

Pupa and larva. Unknown.

Specimens examined. Adults: 1♂ and 1♀, at lights, Lake Ziway, 82/12/31.

Comments. Lehmann (1979) describes the male hypopygium of *P. kibatiense* in detail. In his figure the superior volsella is distinctly narrower than that of *P. annulatum* (Fig. 129). The female differs from most other species described so far (Saether 1977) in that the seminal capsules are longer than the cerci and the ducts are looped, not straight.

Ecology. These specimens were found near the lake and the swampy pools along its margin. Other specimens from South Africa were collected near a large river (Freeman 1958).

Distribution. Most of Afrotropical Region as far south as Cape Town.

Polypedilum (Polypedilum) deletum Goetghebuer

Polypedilum (Polypedilum) deletum, Freeman 1958; McLachlan 1969 (larva); Lehmann 1981.

The male has been described by Freeman and in more detail by Lehmann. Further details are given here, and the female is described.

Adult male (N = 2 mounted). Wing length 2.3 mm.

Colour. Freeman and Lehmann describe the colour as dark brown with a pale wing pattern (illustrated by Freeman) which can be very faint. There are three spots in cell r_{4+5}, a faint spot at the tip of m_{1+2} and in the anal cell, and the fork veins are seamed with grey.

Head. AR 1.9. Frontal tubercles present. Palp segments: 46, 37, 140, 140, 223 µm. 2 or 3 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 16 uniserial, posterior prealars 6, scutellars 7 per side partly biserial.

Wing. Setation: Brachiolum 1, R 25, R_1 20, R_{4+5} 25, squama 10.

Leg. LR fore 1.7, mid 0.6, hind 0.7. sensilla chaetica on tarsomere 1: midleg 4 at tip, hindleg nil.

Hypopygium. Illustrated by Freeman and Lehmann. Anal tergite bands fused basally but continue posteriorly on either side of field of 12-15 long setae separated from apical setae. Anal point thin. Superior volsella narrow and curved. Inferior volsella narrow. Gonocoxite short and broad.

Adult female (N = 5). Wing length 2.0-2.1 mm.

Colour. As for male.

Head. AR 0.47. Frontal tubercles present. Palp segments: 56, 37, 142, 140, 229 μm. 4 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral anteprontals nil, dorsocentrals 25, posterior prealars 6, scutelars 7 per side partly biserial.

Wing. Setation: Brachiolum 1, R 24, R_1 21, R_{4+5} 41, squama 16.

Leg. LR fore 1.7, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 11 towards tip, hindleg 8 towards tip.

Genitalia (Figs 131, 132). Very small ventral ridge on sternite VIII. Dorsomesal lobes large. Ventrolateral lobes small. Apodeme lobe (Fig. 131, left) well chitinized and bearing microtrichia. Gonocoxapodemes narrow and light brown, branching onto dorsomesal lobe but not obviously joining each other. Coxosternapodeme dark and curved. Gonocoxite IX with 6 setae. Segment X with 2 setae per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules small and almost spherical, greatest diameter 47 μm, ducts almost straight with common opening.

Pupa. Unknown.

Larva. Described by McLachlan (1969). Antennal blade much longer than flagellum. Lauterborn organs on segment 3 large. Ventromental plates do not meet; each ends internally in a graceful point. Seta subdentalis of mandible long, thin and almost straight. This larva differs from the unassociated larvae of *Polypedilum* described below.

Specimens examined. 2♂♂, at lights, Lake Awasa, 81/4/15; abundant ♂♂ and ♀♀, at lights, L. Langano, 83/3/14.

Ecology. Breeds both in standing water and in slow running water.

Distribution. Most of Afrotropical region as far south as the Transvaal.

Polypedilum (Polypedilum) dewulfi Goetghebuer

Polypedilum (Polypedilum) dewulfi, Freeman 1958.

Freeman gives a very short description of the male but does not show the hypopygium; this is illustrated here and the female is described.

Adult male (N = 3 mounted). Wing length 2.5-2.6 mm.

Colour. Brown with plain wings.

Head. AR 1.5-1.6. Frontal tubercle minute or absent. Palp segments: 47, 47, 149, 161, 285 μm. 2 or 3 subapical sensilla in segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 32 partly biserial, posterior prealars 10, scutellars 12 per side partly biserial.

Wing. Setation: Brachiolum 1, R 27-31, R_1 28-32, R_{4+5}55-64, squama 16-24.

Leg. LR fore 1.6, mid 0.5, hind 0.7. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil.

Hypopygium (Fig. 133). Anal tergite bands fused basally and continue posteriorly on either side of 17-20 long anal tergite setae; these are well separated from the weaker apical setae. Anal point is downturned at tip. Superior volsella curved with 6 setae on base. Inferior volsella narrow. Gonocoxites short.

Adult female (N = 1). Wing length 3.3 mm.

Colour. Similar to male.

Head. AR 0.4. Minute frontal tubercles. Palp segments broken, about 5 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 54 bi- or triserial, posterior prealars 14, scutellars 18 per side biserial.

Wing. Setation: Brachiolum 1, R 32, R_1 46, R_{4+5} 102 on both surfaces of the wing, M 14, cross vein 2, squama 20.

Leg. LR fore missing, mid 0.5, hind 0.6. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil.

Genitalia (Figs 134, 135). Small curved ventral ridge on tergite VIII bearing 3 setae. Dorsomesal lobe large. Ventrolateral lobe small. Apodeme lobe (Fig. 134, left) large and fan-like, bearing many microtrichia. Gonocoxapodemes narrow and dark, with branch onto dorsomesal lobe, and joined centrally. Coxosternapodeme dark and curved. Gonocoxite IX with 5 setae. Segment X with 5 setae per side, postgenital plate pointed. Labia without microtrichia. Seminal capsules (Fig. 135) ovoid with short necks, 96 µm long without neck, ducts with rightangled bend and common opening.

Specimens examined. 1♂ and 1♀, netted, Abo River, ET2C, 84/10/11; 1♂, netted, Abo River waterfall, ET2, 84/10/18; 2♂♂ bred out in lab from stony run sample, Abo River, ET2, 85/5; 1 intersex, Abo-Kebene River, below ET2C, 85/11.

Ecology. Appears to breed mainly in running water, even in torrential streams.

Distribution. Most of Afrotropical region down to Cape Town.

Polypedilum (*Polypedilum*) *tesfayi*, spec. nov.

Types. Holotype: ♂, Abo River, Addis Ababa, 85/5 (ZSM). - Paratype: pupa and pharate ♂, Kechene Stream near Addis Ababa, 83/11/13 (ZSM).

This new species is based on 1 adult male, 1 pharate male and 1 pupa.

Adult male (N = 1). Wing length 2.9 mm.

Colour. The living fly is grass green with unmarked wings. When preserved it fades to light yellow.

Head. AR 1.5. No frontal tubercles. Palp segments: 65, 47, 198, 171, 279 µm. 4 subapical sensilla on segment 3.

Thorax. No scutal tubercle. Setation: Lateral antepronotals nil, dorsocentrals 19 uniserial, posterior prealars 6, scutellars 13 per side biserial.

Wing. Fig. 136 shows the wing shape. No anal lobe. Setation: Brachiolum 1, R 32, R_1 23, R_{4+5} 52, M 1, cross vein 1, squama 12.

Leg. LR fore 1.6, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: midleg nil, hindleg nil. Tibial scale on foreleg rounded with no spur but with subterminal spine. Single spurs on mid- and hindlegs long and slightly curved.

Hypopygium (Fig. 137). Anal tergite bands not fused, tips enclose field of 20 anal tergite setae; separate from apical setae. Anal point narrow, downturned at tip. Superior volsella base with microtrichia and 1 seta; tip arises subterminally and points inwardly. Inferior volsella fairly broad. Gonocoxites long and broad.

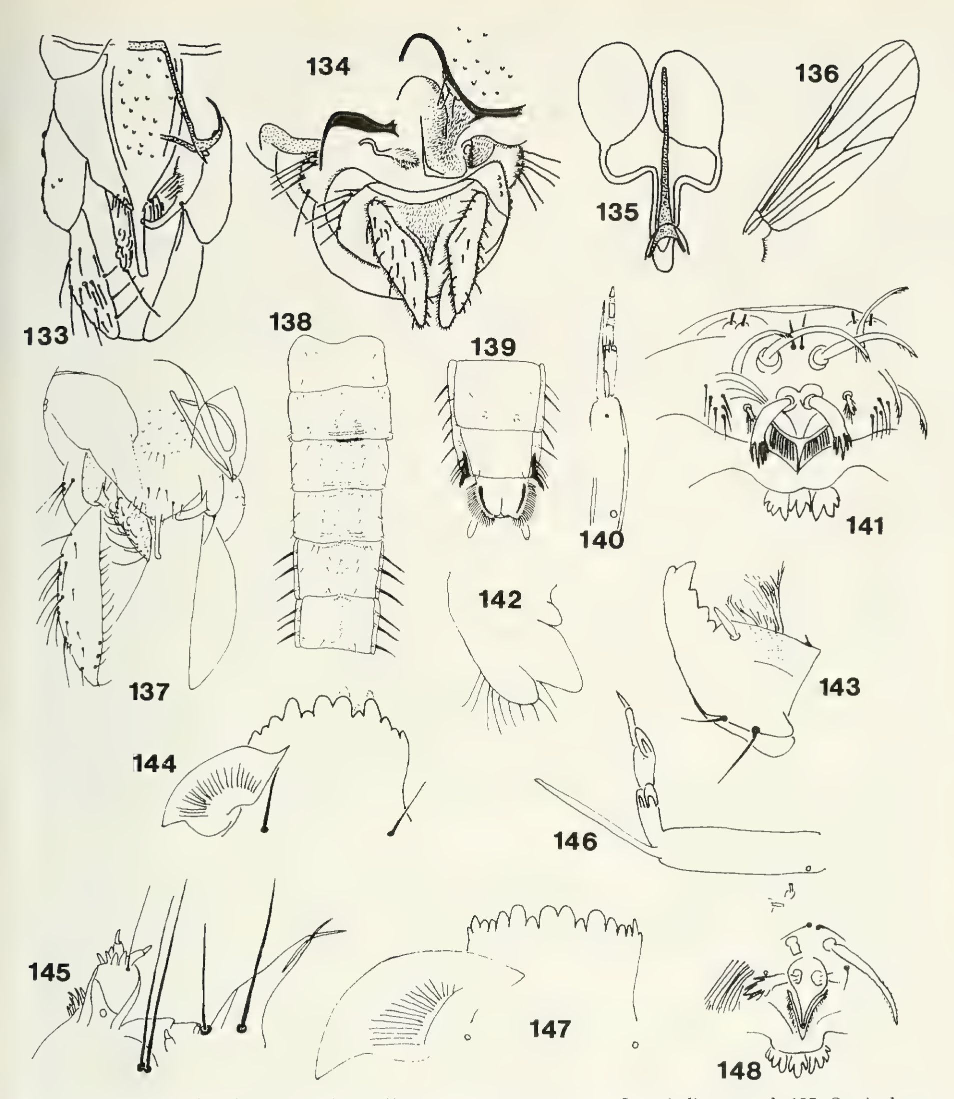
Adult female. Unknown.

Pupa with pharate male (N = 1). Cephalothorax. Surface finely granulose, fine ridges present anteriorly and dorsally. Cephalic tubercles form low humps with no frontal setae. Setae: 2 minute precorneals, no antepronotals, 2 close pairs of minute dorsocentrals, well apart.

Abdomen (Figs 138, 139). Tergites tend to overlap and some setae are reduced to rudiments. Tergite I with no shagreen or spines. Tergites II-V with anterior row of spines and roughly triangular central patches of shagreen. Tergite VI similar but shagreen patch very narrow. Tergites VII and VIII with small shagreen patches in anterior corners. No shagreen in conjunctives. Hook row on tergite II narrow. Pedes spurii A on IV and B on II. Posterolateral spurs on VIII large and dark with 3 terminal teeth (Fig. 139). Anal lobes with genital sac containing gonocoxites of pharate male. Segement I without L setae, II with 1, III and IV with 2, V and VI with 3 lamelliform setae, VII and VIII with 4. Anal fin with 30 setae.

Larva. Unknown.

Specimens examined. 1♂ (type) bred out in lab from a sample from a stony run, Abo River waterfall ET2, 85/5; 1 pupa with pharate ♂, stony run, Kechene River, ET9, 2900 m, 83/11/13.



Figs 133-135. *Polypedilum (Polypedilum) dewulfi*. 133. Hypopygium. 134. ♀ genitalia, ventral. 135. Seminal capsules, ducts.

Figs 136-139. *Polypedilum (Polyprdilum) tesfayi* spec. nov. ♂: 136. Wing. 137. Hypopygium. Pupa: 138. Abdomen, tergites I-VI. 139. Abdomen, tergites VII, VIII, anal lobe.

Figs 140-145. *Polypedilum*, Larva type A. 140. Antenna, 141. Labrum. 142. Premandible. 143. Mandible. 144. Mentum. 145. Maxilla.

Figs 146-147. *Polypedilum*, Larva type B. 146. Antenna. 147. Mentum.

Fig. 148. *Polypedilum*, Larva type C. Labrum.

Ecology. Breeds in torrential streams at high altitudes.

Distribution. Ethiopian Highlands.

Comments. This new species is named for my colleague Tesfaye Berhe, who worked on the ecology of the Abo River. The superior volsella differs from those of all other known African species.

Six larvae of *Polypedilum*, described below as Larva types A to F, were collected either in running water or in lakes. None was associated with its adult.

Larva type A

(N = 15 mounted). Colour. Head capsule yellowish to light brown. Head capsule length 216 µm. Body length maximum about 6 mm.

Antenna (Fig. 140). Blade shorter than flagellum. Lauterborn organs small.

Labrum (Figs 141, 142). Labral lamella with strong central bar, inner chaeta separated from the others and palmate. Premandible (Fig. 142) with three teeth, outer tooth shorter than middle.

Mandible (Fig. 143). All teeth dark, mola with one spine.

Mentum (Fig. 144). Two central teeth, second lateral tooth higher than others. Dotted line on figure shows height in less worn specimens. Medial edge of ventromental plate finely pointed and turned slightly forward.

Maxilla (Fig. 145). Both long lacinal chaetae pointed, chaetulae of palpiger small, a-seta present on palp and both paraxial and antaxial setae well developed.

Body. No markings. Anterior and posterior claws simple, anal tubules short and bluntly pointed.

Specimens examined. 3, Upper Kechene Stream, ET9, 83/11/13; 2, Abo River waterfall, ET2, 83/11/17; numerous, Kebena River, 1984-1985.

Ecology. Common in stony runs in mountain streams and rivers, but sensitive to organic pollution (Tesfaye Berhe et al. 1989).

Distribution. Ethiopian Highlands.

Larva type B

(N = 1). Close to generic definition, except for antenna.

Colour. Head capsule light yellow.

Head capsule length 86 µm.

Body length 4 mm.

Antenna (Fig. 146). Blade reaches segment 4, Lauterborn organs large, on segments 2 and 3.

Labrum. Similar to Type A but S II broadly palmate, like S I. Premandible similar to Type A.

Mandible. Similar to Type A.

Mentum (Fig. 147). Second and sixth lateral teeth higher than the rest. Medial edge of ventromental plate broadly pointed.

Maxilla. Similar to Type A but anterior long chaeta broad not narrow.

Body. No markings; anterior and posterior claws simple; anal tubules short and bluntly pointed.

Specimen examined. 1, stream behind Wendo Genet Hotel, ET 4, 83/10/23.

Comments. Pinder & Reiss (1983) report alternate Lauterborn organs in *Polypedilum nubifer* Skuse, a species atypical in all stages.

Ecology. The specimen came from a stony torrent, partly shaded by riparian vegetation.

Distribution. Ethiopian Highlands.

Larva Type C

(N = 8). Colour. Head capsule light yellowish dorsally, dark brown ventrally.

Head capsule length 1.6 µm.

Body length 3.6 mm maximum.

Antenna. Similar to Type A but Lauterborn organs smaller.

Labrum (Fig. 148). Labral lamella more V-shaped. Inner chaeta reduced and simple, not large and palmate as in Type A.

Premandible similar to Type A.

Mandible. Similar to Type A.

Mentum. Similar to Type A.

Maxilla. Similar to Type A.

Body. No markings. Anterior and posterior claws simple. Anal tubles short and sharply pointed.

Specimens examined. 8, Kebena River, below ET2C, 1984-85.

Ecology. From stony runs in a mountain stream as it entered Addis Ababa. Larva seemed to benefit from mild organic enrichment; the situation is described by Tesaye Berhe et al. 1989.

Distribution. Ethiopian Highlands.

Larva Type D

(N = 15). Head capsule length 130-144 µm.

Body length 4.8 mm.

Antenna (Fig. 149). Blade longer than flagellum, in some specimens straighter than in figure. Segments 3-5 short. Lauterborn organs almost as long as segment 3.

Labrum (Fig. 150). Labral lamella with no central bar.

Mandible (Fig. 151). All teeth dark, mola with 3 spines.

Mentum (Fig. 152). Lateral tooth 1 slightly shorter than 2 and 3. Medial edge of ventromental plate with sharp point turned forward.

Maxilla (Fig. 153). Anterior long lacinal chaeta broad.

Body. No markings. Anterior and posterior claws simple; anal tubules short and pointed.

Specimens examined. 6, stream behind Wendo Genet Hotel, ET 4, 83/10/23; 1, Chancho Stream, ET5, 83/10/29; 2, tributary of Upper Dima River, ET10, 83//20; 4, Upper Abo River, ET2, 83/11/17; 1, Dadi River, ET1, 83/10; 1, Werka Stream, Wendo Genet, ET12, 83/12/10; 2, Sekord River, ET14, 83/12/29.

Ecology. Larvae in stony runs and marginal vegetation of torrential mountain streams.

Distribution. Ethiopian Highlands.

Larva Type E

(N = 10). Differs from generic definition as ventromental plates are contiguous medially.

Colour. Body of preserved specimens orange to orange-red.

Head capsule length 96 µm.

Body length 3.6-5.0 mm.

Antenna (Fig. 154). Blade almost 2× as long as flagellum. Segment 3 very short. Segment 5 reduced to knob in all specimens examined. Lauterborn organs longer than segment 3.

Labrum. Similar to Type D.

Mandible (Fig. 155). All teeth dark; seta subdentalis long and curved; mola with 3 spines.

Mentum (Fig. 156). Lateral tooth 1 very short, lateral tooth 2 much higher than the rest. Ventromental plates blunt medially and contiguous.

Maxilla. Similar to Type D.

Body. No markings. Narrow, longest specimen 5.0 mm long and 0.3 mm wide. Anterior and posterior claws simple. Anal tubules very short and blunt.

Specimens examined. Numerous specimens from Lake Awasa, 1983-84.

Ecology. Common on muddy bottoms near or under weed beds in shallow parts of the lake. The habitat is described by Tilahun Kibret & Harrison (1989).

Distribution. Lake Awasa, Ethiopian Rift Valley.

Larva Type F

(N = 4). Close to generic definition, except for antennal structure.

Colour. Head capsule mostly light yellow with darker posterior ventral patch. Body with no markings, green in life.

Head capsule length 72-105 µm.

Body length 3.0-5.5 mm.

Antenna (Fig. 157). Blade shorter than flagellum. Lauterborn organs on segments 2 and 3.

Labrum. Seta S I large and fan-shaped (Fig 158). Otherwise similar to Type D.

Mandible (Fig. 159). All teeth dark; seta subdentalis long and curved; mola with 2 spines.

Mentum (Fig. 160). Lateral tooth 1 very short, 2 and 3 higher than other laterals. Medial edge of ventromental plates with blunt points, not contiguous.

Maxilla. Similar to Type D.

Body. Anterior and posterior claws simple; anal tubules short and pointed.

Specimens examined. 4, Lake Awasa, 1983-84.

Ecology. Netted in weed beds in lake; these are described by Tilahun Kibret and Harrison (1989).

Distribution. Ethiopian Rift Valley.

Stictochironomus caffrarius Kieffer

Stictochironomus caffrarius, Freeman 1958; McLachlan 1969 (larvae).

One male and a number of larvae were collected.

Adult Male (N = 1). Wing length 2.3 mm.

Colour. As in Freeman 1958; wings with pattern of gray spots as in Freeman's photograph.

Head. AR 2.0. Frontal tubercles small. Palp segments: 46, 62, 124, 130, 211 µm. 3-4 subapical sensilla on segment 3.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 17 partly biserial, posterior prealars 5. scutellars 8.

Wing. Setation: Brachiolum 1, R 16, R_1 11, R_{4+5} 7, squama 16.

Leg. LR fore 1.4, mid 0.6, hind 0.7. Sensilla chaetica on tarsomere 1: midleg 4, hindleg nil.

Hypopygium. Illustrated by Freeman 1958 and similar to that of *S. varius* (Townes) (Cranston et al. 1989). Freeman does not show that the anal tergite bands are strong, joining anterior to the field of 12 anal setae, which are separated from the apical anal setae.

Pupa. Cranston et al. (1989) state that the pupa referred to as Chironomini genus F by Pinder & Reiss (1986) belongs to *S. caffrarius*. It differs from the more usual *Stictochironomus* pupae, and those of other genera, by the long, rigid frontal setae, the three prealar tubercles at the base of the wings and the anal comb with broad apical teeth and needle-like basal teeth.

Larva (N = 6 mounted). Colour. Head capsule yellow dorsally, brown ventrally. Body orange when preserved, with no darker markings.

Head capsule length 390-468 µm.

Body length 3.6-5.0 mm.

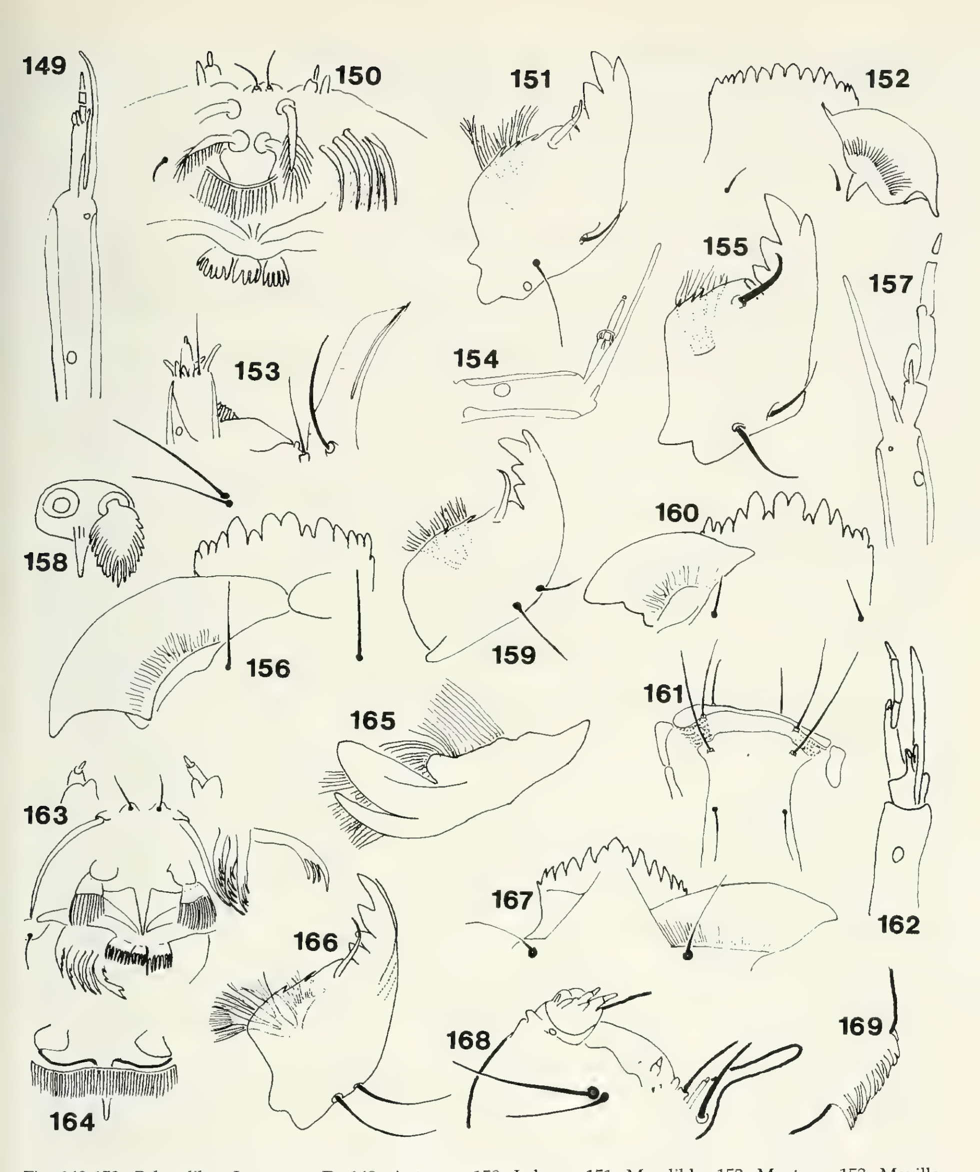
Dorsal surface of head (Fig. 161). Frontoclypeal apotome and labral sclerite 2 present, labral sclerite 1 absent.

Antenna (Fig. 162). 6 segments, basal segment shorter than flagellum; ring organ in distal half of basal segment; blade slightly shorter than flagellum; Lauterborn organs alternate on segments 2 and 3; style on segment 2.

Labrum (Figs 163-165). Bases of S I fused onto common plate with distinct point; S I plumose, S II simple, S III small and simple, S IV large. Labral lamella (Fig. 164) normal. Seta premandibularis normal. Pecten epipharynx with 3 serrated plates. Premandible (Fig. 165) with 3 teeth and brush.

Mandible (Fig. 166). Dorsal tooth absent. 3 inner teeth. All teeth dark. Seta subdentalis long, narrow and curved.

Mentum (Fig. 167). All teeth dark. Trifid central tooth with 6 pairs of lateral teeth. Ventromental



Figs 149-153. *Polypedilum*, Larva type D. 149. Antenna. 150. Labrum. 151. Mandible. 152. Mentum. 153. Maxilla.
Figs 154-156. *Polypedilum*, Larva type E. 154. Antenna. 155. Mandible. 156. Mentum.
Figs 157-160. *Polypedilum*, Larva type F. 157. Antenna. 158. Seta S 1. 159. Mandible. 160. Mentum.
Figs 161-169. *Stictochironomus caffrarius* larva. 161. Dorsal surface of Head. 162. Antenna. 163. Labrum. 164. Labral lamella. 165. Premandible. 166. Mandible. 167. Mentum. 168. Maxilla. 169. Chaetulae of palpiger.

plates separated by more than ⅓× width of mentum; somewhat wider than mentum.

Maxilla (Figs 168, 169). Palp short with small a-seta, chaetulae of palpiger (Fig. 169) normal. Paraxial and antaxial setae present.

Body. Anterior and posterior claws simple. Lateral and ventral tubules absent. Anal tubules short and pointed.

Specimens examined. 1♂ at lights, Lake Langano, 83/12/11; 6 larvae, Lake Chamo, 84/9/29, (col. C. Tudorancea).

Comments. The are similar to those described by McLachlan (1969) but more details are given here.

Ecology. The larvae were dredged from the shallows of Lake Chamo.

Distribution. Most of Africa, Natal to Egypt.

Acknowledgements

This study was part of a programme of cooperative research on fisheries and limnology, developed between Addis Ababa University, Ethiopia, and the University of Waterloo, Ontario, Canada, and aided by the Canadian International Development Agency.

I wish to thank Drs. C. Tudorancea and H. B. N. Hynes, and Ato Tilahun Kibret and Ato Tesfaye Berhe for specimens. I also wish to thank my wife Dr. Jessie J. Rankin for assistance with the drawings and the manuscript.

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4. Guéorguiev, V. B. & B. V. Guéorguiev: Catalogue of the ground-beetles of Bulgaria (Coleoptera Carabidae). - Pensoft Publishers, Sofia, Moscow, 1995. 279 S. ISBN 954-642-003-4.

Ein sehr sorgfältig erarbeiteter, ausführlicher Katalog der Laufkäfer Bulgariens, der die vorkommenden Arten nach dem neuesten Stand von Taxonomie und Nomenklatur aufführt, die Synonyme sowie die wichtigsten Zitate für die bulgarische Fauna enthält und neben Verbreitungsangaben für die Provinzen des Landes zum Teil auch genauere Ortsangaben, durchgängig Höhenangaben und Angaben zur jahreszeitlichen Aktivität, sowie Angaben zur Gesamtverbreitung jedes Taxon enthält. Eine kurze Einführung und eine Checklist eröffnen den Katalog, eine Diskussion über fragliche Arten, ein allgemeines und ein spezielles Literaturverzeichnis und ein Index beschließen ihn. Eine sehr wertvolle Arbeitsgrundlage, deren Bedeutung weit über die bulgarische Fauna hinausgeht.

M. Baehr

5. Kryzhanovskij, O. L., I. A. Belousov, I. I. Kabak, B. M. Kataev, K. V. Makarov & V. G. Shilenkov: A Checklist of the Ground-Beetles of Russia and Adjacent Lands (Insecta, Coleoptera, Carabidae). - Pensoft Publishers, Sofia, Moscow, 1995. 271 S. ISBN 954-642-004-2.

Ein außerordentlich gründlich gemachter Katalog der russischen Fauna, der aber durchaus überregionale Bedeutung besitzt. Dieser Katalog war, vor allem im Westen, seit langem schmerzlich vermißt worden. Wegen der Artenfülle und der zum Teil taxonomisch schwierigen Materie war er wohl nur in Zusammenarbeit zahlreicher jüngerer russischer Kollegen mit dem Altmeister der russischen Carabidologie, O. L. Kryzhanovskij, machbar. Die Arten sind in systematischer Reihenfolge angeordnet, wobei die Großsystematik relativ konservativ ist. Synonyme sind vollständig angegeben, die Verbreitungsangaben beziehen sich auf die Naturräume, bei zahlreichen Arten sind außerdem spezielle Verbreitungsangaben beigefügt. Sehr zahlreiche Fußnoten zu taxonomischen, nomenklatorischen und chorologischen Fragen zeigen, welche Mühe sich die Verfasser gemacht haben. In einer ausführlichen Einleitung werden die taxonomischen und chorologischen Grundlagen des Katalogs diskutiert, eine kurze Übersicht über die geographische Verbreitung der Gattungen, Angaben zu präimaginalen Stadien, ein sehr umfangreiches Literaturverzeichnis und ein Index beschließen den Katalog, der eine vorzügliche Arbeitsgrundlage für jegliche Beschäftigung mit der Laufkäferfauna des riesigen Gebietes zwischen Osteuropa und dem Pazifik bietet.

M. Baehr

6. Bense, U.: Longhorn Beetles. Illustrated Key to the Cerambycidae and Vesperidae of Europe. - Bockkäfer. Illustrierter Schlüssel zu den Cerambyciden und Vesperiden Europas. - Margraf Verlag, Weikersheim, 1995. 512 S., 1260 Abb., 10 Farbabb. ISBN 3-8236-1153-4 (geb.), ISBN 3-8236-1154-2 (paperb.)

Eine sehr sorgfältig gemachte, mit zahlreichen, guten und instruktiven Abbildungen versehene Bestimmungstabelle der europäishen Bockkäfer. Lediglich die *Dorcadion*-Arten sind - nach Ansicht des Rezensenten - mit Recht ausgelassen, weil deren Taxonomie noch sehr im Argen liegt. In den Gattungskonzepten folgt der Autor einer mäßig konservativen Anschauung. Einer kurzen Einleitung, die auch Angaben zur Ernährung, Fortpflanzung, Entwicklung, wirtschaftlicher Bedeutung und Naturschutz enthält, folgt eine Aufschlüsselung der wichtigsten faunistischen Literatur, nach Ländern geordnet. Die Schlüssel sind gut zu benutzen. Die Artenbeschreibungen enthalten eine kurze Charakteristik, Angaben zu Fraß- und Entwicklungspflanzen, Entwicklungsdauer, Flugzeit, sowie einige wichtige taxonomisch-faunistische Literaturzitate und eine Verbreitungskarte. Einige taxonomisch oder chorologisch fragliche Arten werden im Anschluß an den systematischen Teil diskutiert. Ein recht ausführliches Literaturverzeichnis und ein Index schließen den Band ab. Der wichtigste Kritikpunkt an diesem Buch, wie an der gesamten Buchreihe, ist die nach Ansicht des Rezensenten überflüssige zweisprachige Form, die das Buch unhandlich macht und die Benutzung der Tabellen erschwert. Insgesamt ein durchweg erfreuliches Bestimmungsbuch, das jeden Bockkäferliebhaber - auch dem Anfänger - nur empfohlen werden kann

M. Baehr

SPIXIANA	19	1	89–114	München, 01. März 1996	ISSN 0341-8391

Taxonomisch-ökologische Bemerkungen zu mittel- und südeuropäischen Fleischfliegen mit Beschreibung von zwei neuen Arten

(Insecta, Diptera, Sarcophagidae)

Von **Dalibor Povolny**

Povolny, D. (1996): Taxonomical and ecological notes on Central European and South European flesh-flies with description of two new species (Insecta, Diptera, Sarcophagidae). – Spixiana **19/1:** 89-114

Heteronychia macedonica, spec. nov. and *Heteronychia vervesi*, spec. nov. are described from Greece on the basis of series of flies collected during recent years. *Pierretia maroccana* Rohdendorf, 1937 is synonymized with *Heteronychia penicillata* (Villeneuve, 1907), the possible synonymy of *Pierretia portschinskyana* Rohdendorf, 1937 with *Heteronychia schnabli* (Villeneuve, 1911) is indicated, because the latter species is perhaps not restricted to Corsica but widely distributed in the Mediterranean. *Pierretia armeniaca* Rohdendorf, 1937 is synonymized with *Heteronychia ancilla* (Rondani, 1865). *Heteronychia turana* (Rohdendorf, 1937) from Caucasus and Turkestan is for the first time recorded from the Alps and the Balkan Peninsula. *Heteronychia setinervis* (Rondani), *H. fertoni* (Villeneuve), *H. siciliensis* (Böttcher), and *H. porrecta* (Böttcher) are registered from new habitats and characterized as rather common in their adequate niches. *Heteronychia gigas* (Povolny, 1986) is confirmed as a common endemic taxon of the Dalmatian Biokovo-Range. *Heteronychia benaci* (Böttcher, 1913) is recorded from Greece, and some additional notes on taxonomy and ecology of *Heteronychia filia* (Rondani), *H. turana* (Rohdendorf), *Helicophagella novercoides* morpha *novella* (Baranov, 1929), and *Sarcophaga novaki* Baranov, 1941 are added. Male genitalia of all taxa treated are figured.

Prof. Dr. Ing. Dalibor Povolny, DrSc., Department of Zoology, University of Agriculture, Zemêdêlská 1, 613 00 Brno, Czech Republic.

Einleitung

Die Fleischfliegen (im engeren Sinne) (Tribus Sarcophagini) zeichnen sich als fakultative Schmarotzer von Regenwürmern, Schnecken, Insekten, Spinnen und als Prädatoren von fäkaliengebundenen Fliegenmaden durch relativ niedrige Populationsdichten, bedingt durch die beträchtliche Dispersion ihrer Maden in diesen Wirten aus. Die Begegnung der beiden Geschlechter wird durch diesen Umstand erschwert, so daß sich bei den Fleischfliegen die sogenannte Hilltopping-Strategie entwickelt hat. Die Männchen sammeln sich auf luftstrombegünstigten Terrainwellen, Hügeln und Berggipfeln, vorzugsweise über südlich exponierten Hängen, wohin sie spontan bei günstigem (d.h. sonnigem und warmem) Wetter mit den Aufwinden geraten. In den so entstandenen Aggregationen, die Hunderte von Fliegen zählen können, werden von ihnen ritualisierte Duelle ausgeführt, die zur allmählichen Steigerung der Geschlechtsreife und Bereitschaft zur Paarung führen. Die in diese präkonnubialen Männchen-Aggregationen mit den Aufwinden zufliegenden Weibchen werden dort von den ausgereiften Männchen befruchtet. Dieses Phänomen wurde ausführlich von Povolny & Vácha (1988) behandelt. Die Existenz dieser großen Fliegenansammlungen macht es möglich, in derartigen Hilltopping-Situationen sowohl taxonomisch als auch ökologisch (quantitativ) ziemlich repräsentatives

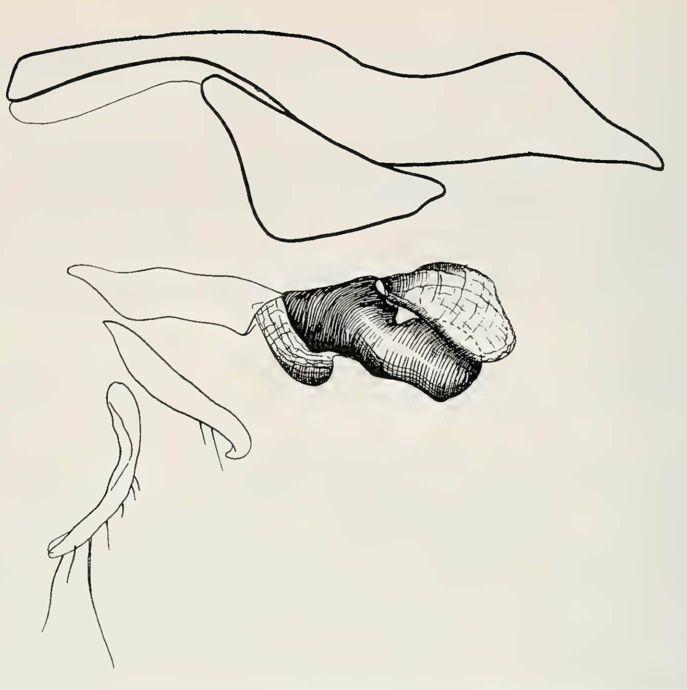


Abb. 1. *Heteronychia (Boettcherella) setinervis* (Rondani). Griechenland Skotina-Vádí, 9.9.1992. Cercus und Paraphallus.

Fleischfliegenmaterial zu sammeln, was u.a. zu Entdeckungen von z.T. scheinbar seltenen oder sogar unbekannten Arten führte, abgesehen von der Möglichkeit, derart quantitativ repräsentatives Material für ökologische Untersuchungen zu nutzen (z.B. Povolny & Znojil 1989, 1990).

Die Anwendung dieser Sammelmethode führte in den letzten Jahren zu wichtigen taxonomisch-faunistischen und auch ökologisch interessanten Resultaten, vor allem in Griechenland und den benachbarten Balkanländern, z.T. auch in den Alpen und dem mitteleuropäischen Raum überhaupt.

Manche dieser Resultate sind Thema dieses Beitrages, in dessen Rahmen zwei neue Arten, einige Synonymien und sonstige noch offene taxonomische und ökologische Fragen gelöst werden. Dabei wird auf die bereits festgestellten Synonyme, die im "Catalogue of Palaearctic Diptera" von Verves (1986) zusammenfassend veröffentlicht wurden, nur hingewiesen.

Das untersuchte Material befindet sich in der Sammlung des Autors, Mährisches Museum Brünn (MMB), in der Zoologischen Staatssammlung, München (ZSM), in der Sammlung von Prof. Dr. J. Verves, Staatliche Ukrainische Universität Kiev (SUU), in der Sammlung von Doz. Dr. M. Slamečková, Landwirtschaftliche Hochschule, Nitra (LHN) und im Természettudományi Múzeum, Budapest (TTM). Außerdem sind alle diese und sonstige faunistische Angaben in der Fleischfliegen-Datenbasis im Besitz des Autors gespeichert.

Heteronychia (Boettcherella) setinervis (Rondani, 1860)
Abb. 1

Sarcophaga setinervis Rondani, 1860, p. 390.

Untersuchtes Material: Griechenland: Große Serien von ♂♂ aus der Umgebung von Meteora (Thessalien), 23.6.1992, 3.9.1992, 18.6.1993; Paralia-Skotina (Vádí), 25.5.1992, 11.-12.9.1992; Platamon, 29.5.1992, 1.6.1992, 3.6.1992, 6.9.1992, 29.8.1992, 10.9.1992, 14.6.1993, 19.6.1993, 24.8.1993, 29.8.1993, 1.9.1993; Panteleimon (Castra), 2.9.1992, 5.9.1992; St. Panteleimon, 17.6.1993, 20.6.1993, 27.8.1993, 31.8.1993. 30.5.-7.6.1994 D. Povolny (MMB).

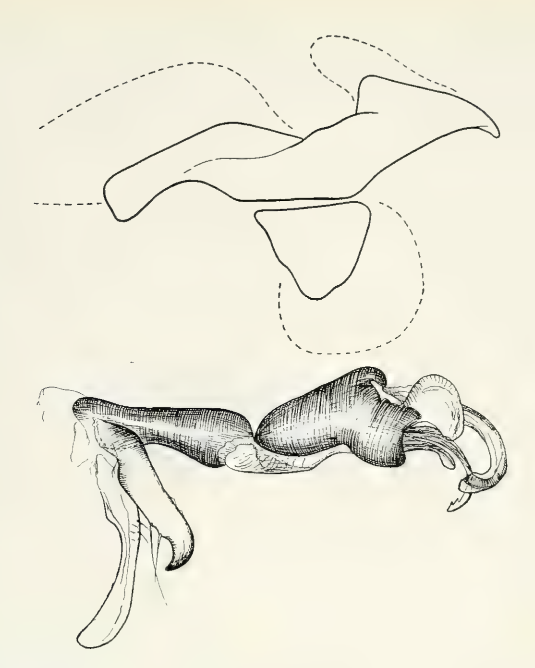


Abb. 2. *H. (Ctenodasypygia) penicillata* (Villeneuve). Bulgarien, Pomorie, 3.8.1989. Cercus und Paraphallus.

Die Art ist im wesentlichen holomediterran verbreitet, sie kommt aber auch im Nordkaukasus und in Transkaukasien bis Turkestan vor. Diese relativ große Verbreitung gemeinsam mit ungenügenden Genitalienabbildungen führte zu zahlreichen Synonymen dieser Art, z.T. bis in die jüngste Zeit. Verves (1986) hat sie zusammengefaßt. Die Art war merkwürdigerweise aus Griechenland bisher unbekannt, obwohl sie z.B. im Flußbett von Pindos und entlang des Ost- und Südosthanges des Olymp auf allen Kalkformationen häufig, zeitweise, besonders im Hoch- und Spätsommer, massenhaft vorkommt. Seltener kommt sie auch auf Konglomeraten (z.B. bei Meteora) und in höheren Lagen vor, wo sie z.T. von der verwandten *Heteronychia (B.) mutila* (Villn.) vertreten wird. Die Art gehört zu den Seltenheiten in den Sammlungen. Sie ist ein Schneckenparasitoid. Die ♂ Genitalien sind durch die blasenförmige laterale Erweiterung der Paraphallusspitze in Kombination mit der Cercusform leicht kenntlich (Abb. 1a, b).

Heteronychia (Ctenodasypygia) penicillata (Villeneuve, 1907)
Abb. 2, 3

Sarcophaga penicillata Villeneuve, 1907, p. 395.
Ascelotis villeneuveana Enderlein, 1928, p. 395 (synonymisiert von Verves 1986).
Pierretia (Bercaea) maroccana Rohdendorf, 1937, p. 325-326 (**syn. nov.**).

Untersuchtes Material: Bulgarien: 7♂♂, Pomorie-Mičurin, 1.-3.8.1989, R.Rozkošny; Griechenland: 2♂♂, Paralia-Skotina (Vádí), 28.5.1992; 4♂♂, Athina (Akropolis), 31.5.1992; 4♂♂, dtto, 30.8.1992; 2♂♂, dtto, 2.9.1993, D. Povolny (MMB).

Diese aus Frankreich (Hérault) beschriebene Art weist eine holomediterrane Verbreitung auf (Nord-Afrika, Palästina, Südfrankreich, Südspanien, Süditalien, ehem. Jugoslawien). Sie wurde unlängst auch an der südbulgarischen Schwarzmeerküste bei Pomorie von Prof. Rozkošny (Brünn) gesammelt und von mir auch für Griechenland nachgewiesen. Dieses Material ermöglichte mir, die Variationsbreite der ♂ Genitalien dieser Art zu untersuchen (Abb. 2, 3), die relativ gering ist. Abbildungen davon zeigen

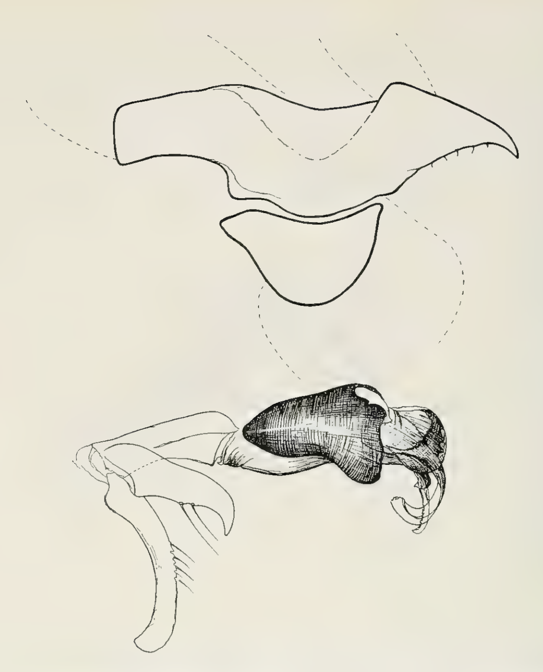


Abb. 3. *H. (C.) penicillata* (Villeneuve). Griechenland, Atina, 3.8.1992. Cercus und Paraphallus.

eher unterschiedliche Lagen der Präparate. Diese Untersuchungen bestätigen eindeutig, daß die von Rohdendorf (1937) beschriebene "*Pierretia (Bercaea)*" *maroccana* (nach einem Männchen aus Marokko, Ain Defali) mit *H. (C.) penicillata* (Villn.) konspezifisch ist. Zu vergleichen sind dazu auch Rohdendorfs (1937) Skizzen 432-435, die die von mir abgebildeten Variabilitätgrenzen der ♂ Genitalien dieser Art weitgehend bestätigen. Die Art ist ein xerothermophiler Begleiter von Sanddünen und trockenen Flußbetten in Meeresnähe. Die Weibchen wurden bei Madenablage auf terrestrische Heliciden beobachtet. Die Art ist neu für Bulgarien und Griechenland.

Heteronychia (Ctenodasypygia) siciliensis **(Böttcher, 1913)**
Abb. 4a, 5

Sarcophaga siciliensis Böttcher, 1913, p. 125

Untersuchtes Material: Bulgarien: 1♂, Pomorie, 28.7.1971, D. Povolny; 1♂, Mičurin, 1.8.1989, R. Rozkošny; Griechenland: 1♂, Paralia-Skotina (Vádí), 27.5.1992; 3♂♂, dtto, 30.5.1992; 1♂, dtto, 7.9.1992; 1♂, dtto, 12.9.1992; 2♂♂, dtto, 28.8.1993; 1♂, dtto, 30.8.1983; 1♂, Panteleimon (Castra), 5.9.1992; 1♂, dtto, 12.9.1992; 1♂, dtto, 16.6.1993; 1♂, dtto, 21.6.1993; 6♂♂, St. Panteleimon, 20.6.1993, D. Povolny (MMB).

Diese mir von der südbulgarischen Schwarzmeerküste um Pomorie bekannte Art (siehe auch Povolny & Verves 1990) konnte ich inzwischen in etlichen Habitaten der griechischen ägäischen Küste sammeln. Sie kommt stets vereinzelt in heißen, trockenen Bachtälern (Vádí) oder auf sonnigen Kalkriffen, oft in unmittelbarer Nähe des Meeres vor, so z.B. bei Skotina, St. Panteleimon und Platamon. Sie fliegt von Ende Mai und Juni bis August und Anfang September und ist ein Heliciden-Parasitoid. Die Art ist bisher aus Nordafrika, Sizilien, Griechenland, Rumänien, Bulgarien und der Krim bekannt und überall selten. Meine Funde sind neu für Griechenland. Wegen ihrer Ähnlichkeit mit *Heteronychia (Ctenodasypygia) penicillata* (Villeneuve, 1907) soll die Richtigkeit ihrer Identifizierung durch zwei Genitalienskizzeu bestätigt werden (Abb. 4, 5), die auch die Variationsbreite dieses Gebildes widerspiegeln.

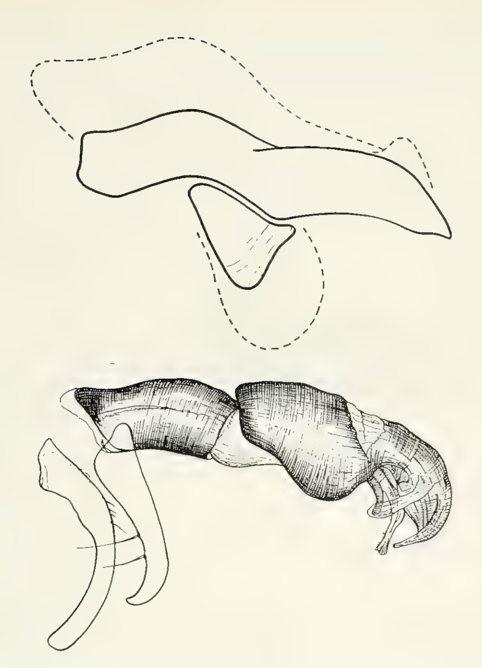


Abb. 4. *H. (C.) siciliensis* (Böttcher). Bulgaria, Pomorie, 3.8.1989. Cercus und Paraphallus.

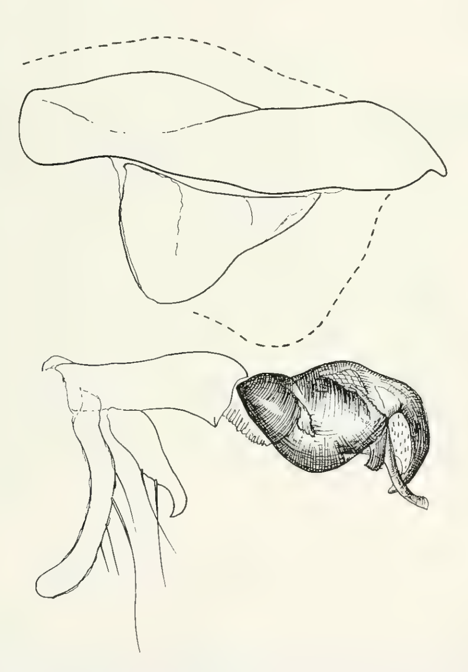


Abb. 5. *Heteronychia (Ctenodasypygia) siciliensis* (Böttcher). Griechenland, Skotina-Vádí, 27.5.1992. Cercus und Paraphallus.

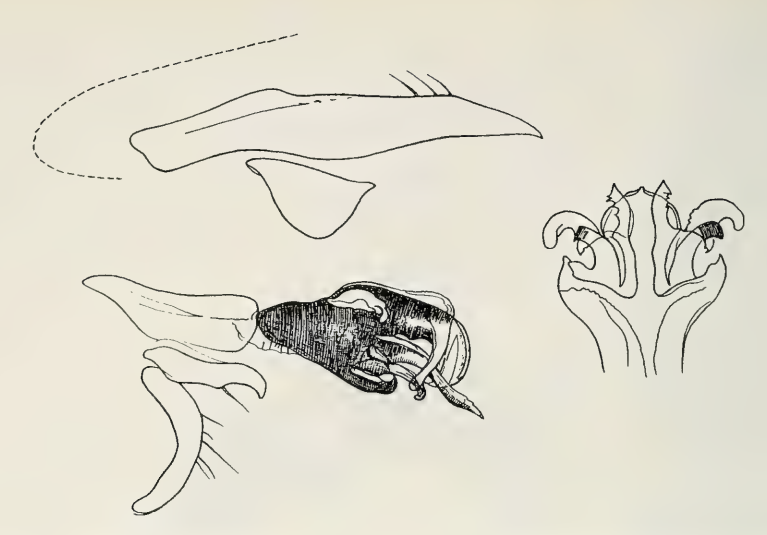


Abb. 6. *H. (C.) fertoni* (Villeneuve). Mähren, Tišnov-Kvêtnice, 28.4.1993. Cercus, Paraphallus, und Paraphallusspitze in Ventralsicht.

Heteronychia (Ctenodasypygia) fertoni (Villeneuve, 1911)
Abb. 6

Sarcophaga fertoni Villeneuve, 1911, p. 127.

Untersuchtes Material: Ungarn: 2♂♂, ohne genaue Bezeichnung, aber höchstwahrscheinlich aus Ungarn (TTMB); Mähren; 2♂♂, 28.4.1993, Kvêtnice (Tišnov bei Brünn), D. Povolny (MMB).

Diese seltene Art aus der Untergattung *Ctenodasypygia* ist holomediterran verbreitet (Verves 1986), ihre Verbreitung reicht aber im Norden bis nach Ungarn. An ihrer nördlichen Verbreitungsgrenze ist die Art äußerst selten, und die Fundorte aus Ungarn sind nur mangelhaft bzw. kaum belegt (Mihályi 1979). Ich konnte diese Art völlig unerwartet auf dem Kalkhügel von Kvêtnice über dem Städtchen Tišnov, ungefähr 20 km nordwestlich von Brünn, in einer Hilltopping-Situation nachweisen (2♂♂, 28.4.1993) (Abb. 6). Da ich dieses Habitat seit mindestens 2 Jahrzehnten intensiv quantitativ besammele, wäre mir die frühere Anwesenheit dieses mediterranen Taxons kaum entgangen. Der Fund dieser Art fällt zeitlich zusammen mit der Verbreitungswelle von mediterranen Insekten aus dem europäischen Südosten in den sommerlichen Hitzewellen der letzten Jahre. Zu diesen zählen vor allem die massive Immigration des Gelblings *Colias erate* (Esper, 1803) in die Südslowakei und nach Südmähren seit dem Sommer 1990 und von den Fleischfliegen die seltene aber andauernde Anwesenheit der subtropischen synanthropen *Liopygia crassipalpis* (Macquart, 1839) in Südmähren (Pollauer Berge und Kurdêjov von 1989-1993) sowie gelegentliches Vordringen der subtropisch-tropischen *Liosarcophaga tibialis* (Macquart, 1850) und der Schmeißfliege *Chrysomyia albiceps* (Wiedemann, 1819) usw. Es dürfte unter diesen Umständen nicht ausgeschlossen sein, daß auch die Anwesenheit von *H. (C.) fertoni* im südmährischen Raum mit diesen Invasionen zusammenhängt. Die Art wurde in Tschechien bisher nicht beobachtet.

Heteronychia (Eupierretia) macedonica, spec. nov.
Abb. 8, 9, 10

Typen. Holotypus: ♂, Griechenland: Paralia, St. Panteleimon 26.-29.8.1993. D. Povolny (MMB). – Paratypen: 2♂♂, Paralia Platamon, 25.8.93; 4♂♂, dtto, 28.8.93; 3♂♂, dtto, Skotina, 2.9.93; 5♂♂, dtto, Leptokaria, 29.8.93; 4♂♂, Thessalien, Meteora-Kalambaka, 24.6.92; 1♂, Makedonia, Pindos-Gebirge, Vikos Aoos, 16.6.91 (ZSM); 28♂♂, Panteleimin (Castra), 16.6.1993, 43♂♂, St. Panteleimon, 26.-29.8.1993, D. Povolny (MMB).

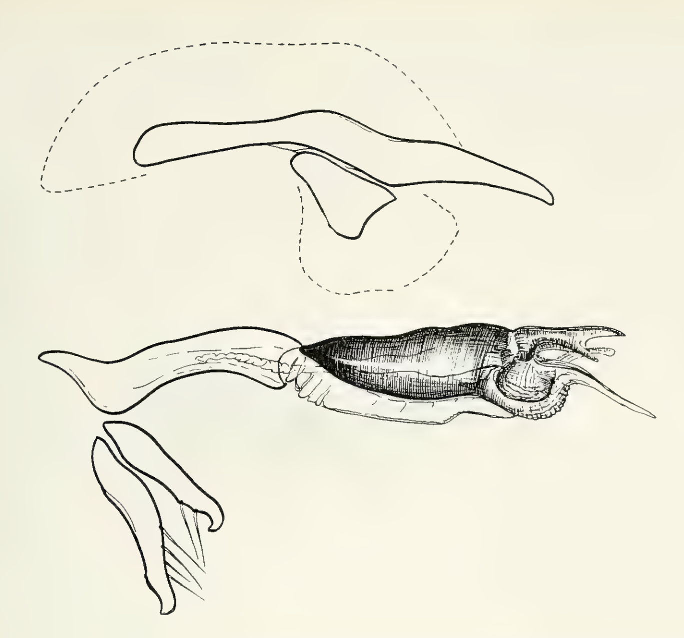


Abb. 7. *H. (Eupierretia) vicina* (Macquart). Thüringen, Bad Blankenburg, 23.6.1977. Cercus und Paraphallus.

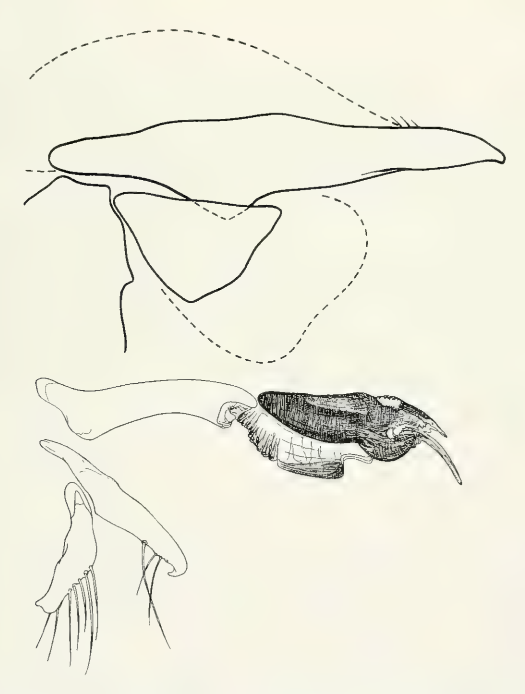


Abb. 8. *Heteronychia (Eupierretia) macedonica*, spec. nov., Paratype. Griechenland, Makedonien, Pindos-Gebirge, Vikos-Aoos, 18.6.1991. Cercus und Paraphallus.

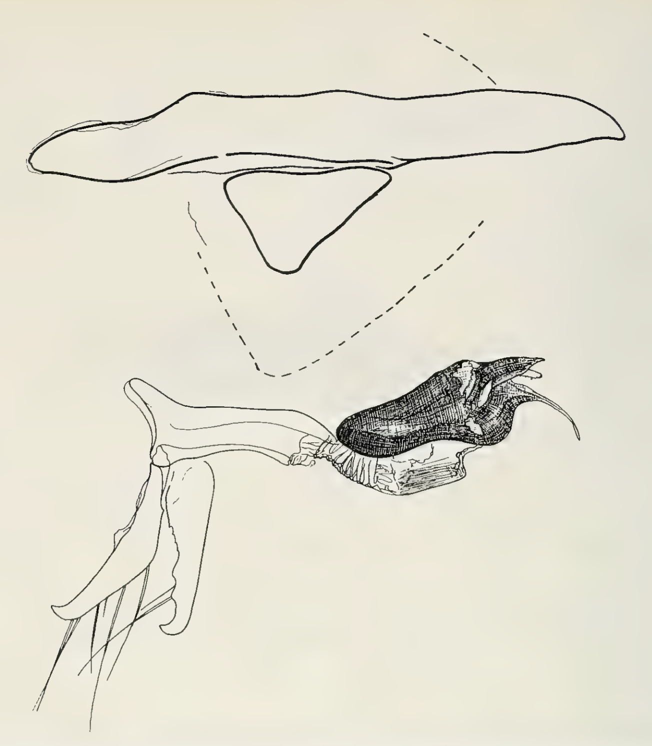


Abb. 9. *H. (E.) macedonica*, spec. nov., Paratype. Griechenland, Paralia, Platamon, 6.6.1992. Cercus und Paraphallus.

Weiteres untersuchtes Material: *Heteronychia (Eupierretia) vicina* (Macquart, 1836): größere Serien, Deutschland: Thüringen, Umg. v. Bad Blankenburg (s. Povolny & Znojil 1990).

Beschreibung

♂. Parafrontale tief samtschwarz silberglänzend; Stirnstrieme (vitta frontalis) samtschwärzlich und zur Fühlerbasis (frontoventral) hin 1.2-1.3 × breiter (erweitert). Fühler und Oralpartie schwärzlich, Epistom halbmondförmig, bräunlich. Thorax aschgrau mit drei länglichen, schwarzen Striemen, die z.T. bis auf das Scutellum übergreifen. Flügel hyalin mit mäßig schwärzlicher Tönung. Adern tiefschwarz; Epaulette und Basicosta schmutzig weißlich. Abdomen schwärzlich mit deutlichen aschgräulichen Flecken (Makeln), mäßig glänzend. VIII Tergosternit deutlich länger als breit, zylindrisch, glänzend schwarz. Analtergit glänzend ziegel- bis scharlachrot, Genitalien tiefschwarz glänzend, teilweise dicht behaart.

Stirn entspricht an der schmalsten Stelle etwa ⅕, am Vertex etwa ¼ und an der Fühlerbasis etwa ⅓ der Kopfbreite. Drittes Fühlerglied (Antennomere) etwa 1.2-1.4 × länger als das zweite. Arista sehr lang und fein, dünn bewimpert. Gena (Parafaciale) fast parallelseitig und an der Fühlerbasis etwa ⅕ der Augenhöhe entsprechend. 8-9 Paar Frontal(Frontoorbital)borsten, stark und frontal gekreuzt. Äußere Stirnborste (Vertikalborste – ev) relativ kurz, aber deutlich. Ocellarborsten kräftig. Drei Reihen Postorbital(Postocular)borsten, die erste mäßig kräftiger als die zwei übrigen. Parafrontale mit einer Reihe deutlicher Borsten. Backen(Gena)höhe auf dem Niveau der Vibrisse entspricht etwa ⁴⁄₁₀ der Augenhöhe.

Thorax-Chetotaxie. ac O+1, dc 3 (praesutural) + 3 (postsutural), alle deutlich; ia 1+2, h 3, ph 1; Propleuron kahl, npl 2 und 2 schwächere aber deutliche Borsten und einige feine Microchaetae. Dorsoscutellare Borsten 1 (schwach), Schildchenborsten (ap, subap und lat) deutlich; r1 kahl, r4+5 kurz und fein beborstet; Längenverhältnis des 3./5. Costalabschnitt = 1:1, des 2./3. = 1:0.6. Drittes Abdomi-



Abb. 10. *H. (E.) macedonica*, spec. nov., Paratype. Griechenland, Paralia, Skotina-Vádí, 29.5.1992. Cercus und Paraphallus.

naltergit mit einem Paar mediomarginaler und einem Paar lateromarginaler Borsten, viertes Tergit mit einem Paar mediomarginaler und zwei Paaren lateromarginaler Borsten. Fünftes Abdominalsegment mit einer Reihe von kräftigen Marginalborsten.

♂ Genitalien. Cercus vorgezogen, mit einer kurzen, relativ stumpfen Spitze. Dorsalkante des Cercus seicht gewellt bzw. dreimal mäßig durchgesattelt, Ventralkante unter der Spitze mäßig aber deutlich verdickt. Coxit (fast) dreieckig mit abgerundeten Ecken, Oberkante deutlich länger als Lateralkanten. Theca des Aedeagus relativ schlank. Länge des Aedeagus ungefähr entsprechend (fast gleich lang). Paraphalluskörper mäßig länger als breit, Ventralfortsatz sehr schlank und dünn, mäßig konkav gebogen; Paraphallusmembran im Gegensatz zur stark sklerotisierten und schwarz pigmentierten Paraphallusspitze mäßig durchsichtig; Vorderapophyse plump kolbenförmig, Spitze stumpf abgerundet, kaudal mäßig spitz auslaufend, Vorderkante mit zahlreichen langen Borsten besetzt; Hinterapophyse schlanker, eher häkchenförmig, mit häkchenförmiger, kurzer Spitze, ihre Dorsalkante glatt. Innen(Ventral)kante gewellt und mit 3-4 Borsten. Analtergit glänzend ziegel-bis scharlachrot, lateroventral verdunkelt, dünn schwärzlich bewimpert; Cercus, Coxit und Apophysen glänzend tiefschwarz, schwarz behaart bis bewimpert (Abb. 8-10).

♀ unbekannt.

Differentialdiagnose

Die Art steht *Heteronychia (Eupierretia) vicina* nahe und ist ihr habituell ähnlich, ist von dieser aber in mehreren Einzelheiten deutlich unterschiedlich (Abb. 7). Der Cercus von *H. vicina* wirkt schlanker, ist dünner und hat vor allem eine deutliche Durchsattelung. Dagegen ist die Dorsalkante des Cercus bei *H. macedonica* "gewellt" und dreimal mäßig eingebuchtet. Coxit von *H. macedonica* ist robust und fast dreieckig, bei *H. vicina* eher subtil mit mehr abgerundeten Ecken, was seine dreieckige Form etwas abschwächt. Bei *H. macedonica* ist der Paraphalluskörper fast gleich lang wie breit und wirkt eher gedrungen, während er bei *H. vicina* auffallend schlank ausläuft und wesentlich länger als breit ist. Vor allem die Theca des Paraphallus ist deutlich schlanker and schmaler (länger als breit) als bei

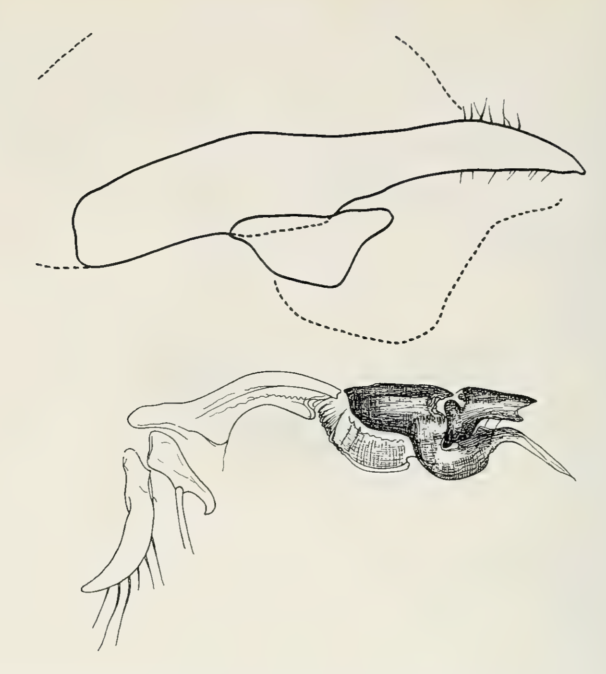


Abb. 11. *Heteronychia (Eupierretia) vervesi*, spec. nov., Paratype. Griechenland, Makedonien, Pindos-Gebirge, Vikos Aoos, 18.6.1991. Cercus und Paraphallus.

H. macedonica. Daher steht die Länge des Paraphallus im Kontrast zu den relativ kurzen Apophysen. Dieser Kontrast fehlt bei *H. macedonica* völlig. Die kurze dornförmige Spitze auf der Dorsalwand des Parapgallus trägt bei *H. vicina* stets noch einen kurzen lateralen Ausläufer. Dieser ist bei *H. macedonica* entweder nur angedeutet oder fehlt. Die rote Tönung des Analtergites von *H. macedonica* ist deutlich dunkler als bei *H. vicina*, wo sie eher ziegelrot erscheint. *Heteronychia vicina* ist eine relativ stattliche Fliege, mit einer Körperlänge um 11-12 mm, wobei Individuen unter 10 mm seltener vorkommen. *H. macedonica* ist im Durchschnitt kleiner (meist 9-10 mm lang), größere Individuen (um 12 mm) sind eher eine Ausnahme.

Ökologie

Heteronychia vicina ist ein Begleiter von hochalpinen Formationen auf Kalk, wobei ihr Schwerpunkt in Höhen um etwa 1.600-1.800 m liegt, also dicht über der Waldgrenze. Während sie am Rande der Waldgranze nur vereinzelt vorkommt, kann sie oberhalb dieser auf kahlen Wänden und Kalkriffen der Alpen (z.B. in Südbayern – Leonhardstein, Schindelberg), oder in den Lunzer Alpen in Österreich (z.B. Ötscher, Hochkar) massenhaft vorkommen. In den Karpaten kommt sie seltener aber auch montan vor (z.B. in der Kleinen und Großen Tatra der slowakischen Karpaten). Seltener und offenbar disjunkt kommt sie auch in Skandinavien vor (Pape 1987). Ihr seltenes extrazonal-demontanes Vorkommen konnte unlängst auch in niedrigen Lagen der Muschelkalkgebiete Thüringens (Povolny & Znojil 1990) und in Inversionslagen des Böhmischen Karstes in Mittelböhmen nachgewiesen werden, wo sie zwischen 400 und 600 m fliegt. In Bulgarien kommt *H. vicina* eher vereinzelt z.B. im Vichren-Gebirge vor (Povolny & Verves 1990). *Heteronychia macedonica* ist ein häufiger, oft massenhaft auftretender Begleiter der Kalkformationen Griechenlands, wobei sie in trockenen Flußtälern (Vádí) unter dem Olymp, die ins Ägäische Meer münden, und auf den benachbarten Kalkhügeln, z.B. entlang der Meeresküste zwischen Katharini-Skotina-St. Panteleimon-Platamon bis zum Pinios-Tal, in Höhen zwischen 5 und 600 m weit verbreitet ist. Vereinzelte Exemplare konnte ich auch auf den Konglomeraten von Meteora, im Flußtal von Pinios bei Kalambaka und im Pindos-Gebirge (Aoos) in Nordwest-

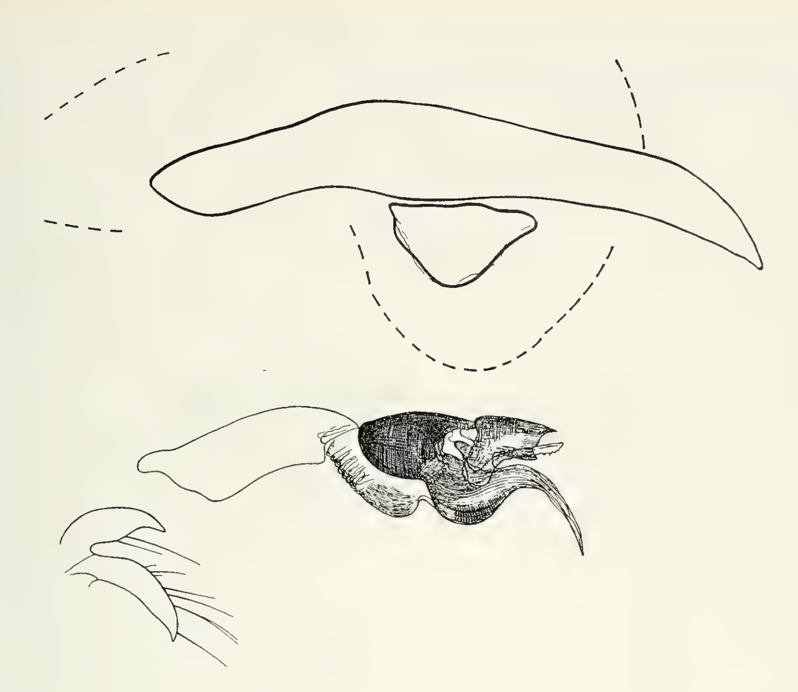


Abb. 12. *H. (E.) vervesi*, spec. nov., Paratype. Griechenland, Thessalien, Meteora. 2.6.1992. Cercus und Paraphallus.

Griechenland, sammeln. Die Art steigt also bis in Höhen um 1600 m, fehlt aber oberhalb der Waldgrenze. Sie ist selbst im Hoch- und Spätsommeraspekt stellenweise häufig. *H. macedonica* scheint also sowohl verbreitungsmäßig als auch ökologisch mit *H. vicina* zu vikariieren, zumal sie in Griechenland extrem xerotherme Habitate begleitet.

***Heteronychia (Eupierretia) vervesi*, spec. nov.**
Abb. 11, 12

Typen. Holotypus: ♂, Griechenland: Makedonia, Pindos-Gebirge, Vikos Aoos, 1600 m, 20.6.91 (coll. Povolny, MMB). – Paratypen: 7♂♂, dtto; 6♂♂, dtto, 26.6.91; 2♂♂, dtto, 22.6.91; 1♂, Griechenland, Thessalia, Meteora-Kalambaka, 800 m, 2.6.92; 3♂♂, Griechenland, Paralia, Skotina (Vádí), 27.5.92: 1♂, dtto, 4.9.92; D. Povolny (MMB) (davon 2 Paratypen in ZSM, 2 Paratypen in coll. Verves SUU).

Beschreibung

♂. Parafrontale und Parafaciale tief samtschwarz, intensiv silberglänzend. Stirnstrieme (vitta frontalis) samtschwärzlich und zur Flügelbasis (frontoventral) hin etwa 1.2-1.3 mal breiter (erweitert). Fühler und Oralpartie schwärzlich, Epistom ziemlich breit, halbmondartig, bräunlich. Thorax dunkel aschgrau mit glänzend schwarzen Striemen, von denen besonders die mittlere auf das Schildchen übergreift. Flügel hyalin, fast ohne schwärzliche Tönung, Adern schwarz, Epaulette und Basicosta hell mit mäßig bräunlichem Stich. Abdomen schwärzlich glänzend mit schillernden aschgrauen Flecken (Makeln). Das achte Tergit kaum auffallend zyllindrisch, kurz und glänzend schwarz. Analtergit dunkel bis schwärzlich rötlich, mäßig glänzend, Genitalien tiefschwarz.

Stirn an der schmalsten Stelle etwas mehr als $\frac{1}{5}$, am Vertex etwa $\frac{1}{4}$ und an der Fühlerbasis etwas weniger als $\frac{1}{3}$ der Kopfbreite. Drittes Fühlerglied (Antennomere) 1.2-1.3 × länger als das zweite. Arista lang, tiefschwarz, Basalviertel mäßig keulenförmig verdickt und fein dünn bewimpert. Gena (Parafaciale) fast parallelseitig und an der Fühlerbases etwa 2.5 × schmaler als die Augenhöhe. 7-9 Paar

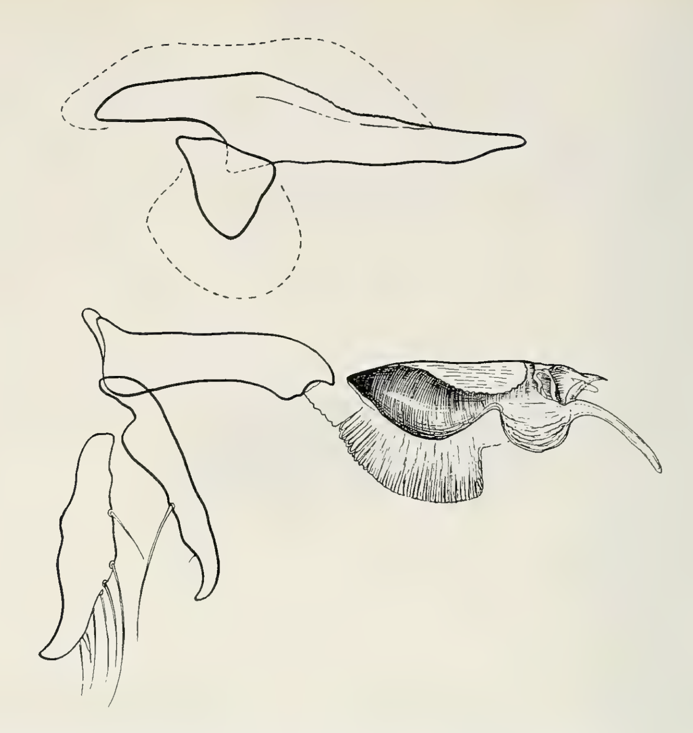


Abb. 13. *Heteronychia (Eupierretia) porrecta* (Böttcher). Slovakia, Malá Fatra, Skalné mesto, 11.7.1976. Cercus und Paraphallus.

Frontal(Frontoorbital)borsten, z.T. sehr stark und frontal gekreuzt. Äußere Stirnborste (Vertikalborste – ev) kurz und schwach. 1 Paar Ocellarborsten sehr kräftig, etliche weitere oc kürzer und schwächer. Drei Reihen Postorbital(Postocular)borsten, die dritte Reihe weniger deutlich, die erste besteht aus kräftigeren und z.T. längeren Borsten. Parafrontalborsten (eine Reihe) z.T. sehr kräftig. Backen(Gena)höhe auf dem Niveau der Vibrisse etwa $^{4}/_{10}$ bis $^{5}/_{10}$ der Augenhöhe.

Thorax-Chaetotaxie. ac O+1 (sehr schwach), dc 3 (praesutural) + 3 (postsutural) ziemlich kräftig; ia 1+2, ph 1 (2); Propleuron kahl; npl 3 (die mittlere stark und lang). Dorsoscutellare Borsten fehlen, Schildchenborsten (ap, subap, lat) deutlichi, r1 kahl, r4+5 mit deutlichen kurzen Borsten. Längenverhältnis des 3./5.Costalabschnitt = 1:1, des 2./3. = 1:1.5. Drittes Abdominaltergit mit einem kurzen Paar mediomarginaler und mit einem Paar lateromarginaler Borsten, viertes Abdominaltergit mit einem deutlichen Paar mediomarginaler und mit zwei Paaren lateromarginaler Borsten. Fünftes Abdominalsegment mit einer Reihe von kräftigen Marginalborsten.

♂ Genitalien. Cercus als Ganzes mäßig gebogen und allmählich zugespitzt, auf dem Niveau des Coxits etwas dicker und Oberkante mäßig konvex. Coxit länger als breit, nahezu dreieckig. Theca des Aedeagus fast gleich lang wie Aedeagus (Paraphallusspitze). Dieser ziemlich kurz und plump, läuft in einen zweifachen Dorn (paarig) aus, der dünne Ventralfortsatz ragt deutlich vor, ist aber nicht sehr lang. Die halbmondartige, stark ausgewölbte Lateralwand des Paraphallus glänzend schwarz. Paraphallusmembran ebenfalls schwarz pigmentiert, aber kaum glänzend und leicht transparent. Vorderapophyse zwar länger als die Hinterapophyse, aber beide relativ kurz, Vorderapophyse deutlich bogenförmig, mit deutlich konvexer Vorderwand, Hinterapophyse kurz häkchenförrming. Bewimperung siehe Abb. 11b, 12b. Die Kürze der beiden Apophysen steht im deutlichen Kontrast zur Länge des Paraphallus. Analtergit dunkelrot bis schwärzlich rot, Cercus, Coxit, Apophysen tiefschwarz, Paraphallusaussenwand glänzend, nur Theca und Paraphallusmembran schwarz transparent.

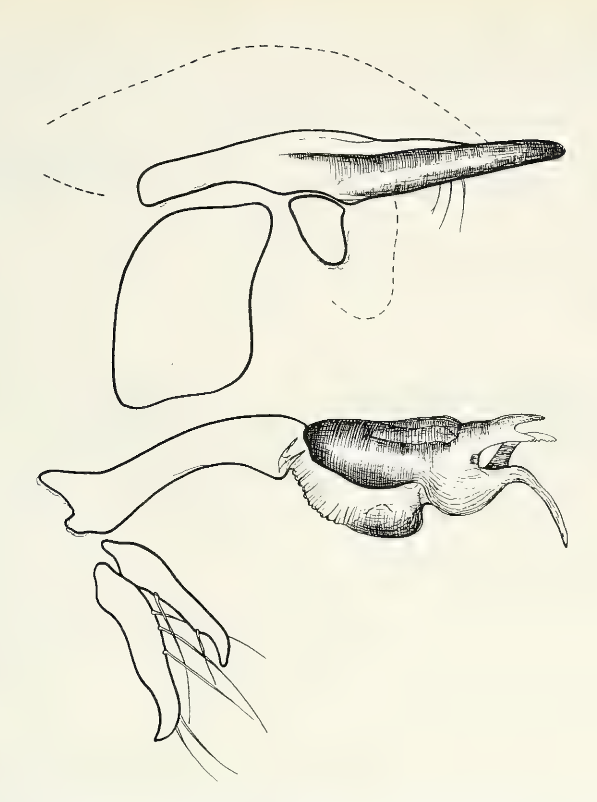


Abb. 14. *H. (E.) porrecta* (Böttcher). Griechenland, Olymp. Tal unterhalb Kataphygion I, 4.8.1993. Cercus und Paraphallus.

Verwandtschaft

Die Art ist ein charakteristisches Taxon der Untergattung *Heteronychia* und ist an den kurzen Apophysen und and der Form des Cercus sofort erkennbar.

Ökologie

Heteronychia vervesi ist eine eher seltene, aber in Nordgriechenland wahrscheinlich weitverbreitete Art, die von der unmittelbaren Umgebung der ägäischen Küste (z.B. bei Skotina) über thessalische Gebirge (Meteora bei Kalambaka) bis in die Hochgebirgslagen des Pindos-Gebirges in Nordwest-Mazedonien vorkommt. Sie wurde im Gegesatz zu Arten wie z.B. *H. setinervis* oder *H. macedonica* nur im Spätfrühlingsaspekt gesammelt, während sie in der Trockenzeit ab Mitte Juni immer seltener wird und allmählich verschwindet.

Heteronychia (Eupierretia) porrecta **(Böttcher, 1913)**

Abb. 13-15

Sarcophaga porrecta Böttcher, 1913, p. 361.
Heteronychia bulgariensis Lehrer, 1977 (synonymisiert von Verves 1986)

Untersuchtes Material: 2♂♂, Slovakia: Malá Fatra (Kleine Fatra), (Skalné mesto) 750 m, 11.7.1976; 2♂♂, Velká Fatra, (Große Fatra) – Gadierská dolina, 16.7.1975 (coll. Slamečková, LHN), 1♂ dtto, 18.7.83 (coll. Povolny, MMB) (s. auch Povolny & Slamečková 1979); Bulgarien: D. Povolny & Verves (1990); Griechenland: 8♂♂, Makedonia,

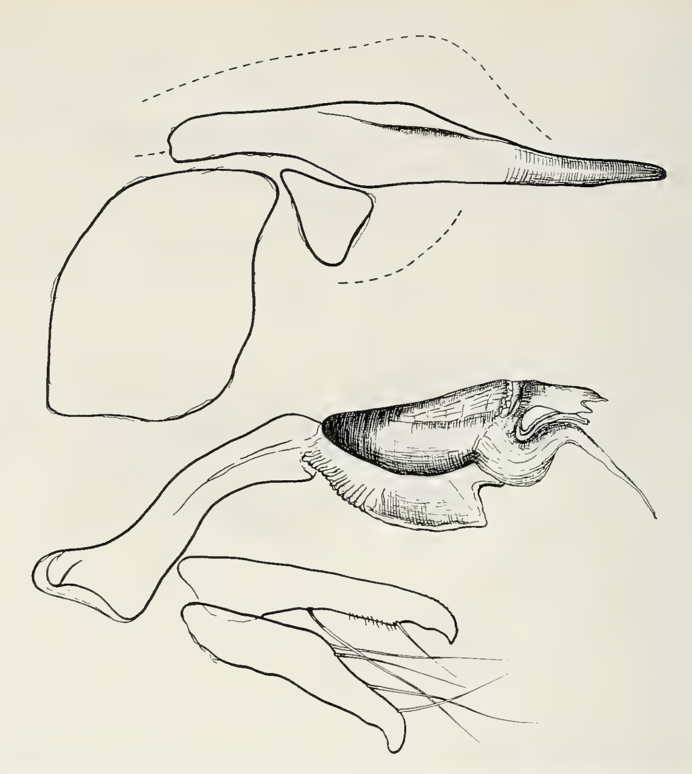


Abb. 15. *H. (E.) porrecta* (Böttcher). Griechenland, Olymp, Mikas-Schlucht, 4.8.1993. Cercus und Paraphallus.

Pindos-Gebige, Vikos Aoos, 17.-19.6.1991; 6♂♂, Olymp, Kataphygion I, 8.9.1992; 9♂♂, dtto, 26.8.1993, D. Povolny (MMB); 3♂♂, mangelhaft bezeichnet mit "Veglia" (Italien), aber mit authentischer Bestimmung durch Böttcher (ZSM). Es dürfte sich dabei um Syntypen dieser Art handeln.

Die Art wurde ursprünglich aus den italienischen Dolomiten (Trentino – Alto Adige, Bolzano) beschrieben und Jahrzehnte lang nicht mehr gesammelt. Die ersten Neufunde veröffentlichten Povolny & Slameçková (1979) aus der Slowakischen Fatra, später wurde die Art auch im bulgarischen Vichren-Gebirge (Povolny & Znojil 1993) und bei Kastenec gesammelt [als *Heteronychia bulgariensis* (Lehrer) beschrieben]. Ich konnte eine Serie von ♂♂ im mazedonischen Pindos Gebirge im Nationalpark Aoos im Juni 1991 bei 1600 m Seehöhe sammeln. Die Art lebt dort in lichten Hochgebirgslaubwäldern dicht unter der Waldgrenze. Die Männchen sitzen in der Mittagshitze im Halbschatten der Baumkronen an Waldrändern und üben dabei ritualisierte Gefechte. Noch häufiger war die Fliege dicht über der Waldgrenze im Tal etwa 200 m unterhalb Kataphygion (Mikas) im Olymp-Komplex, wo zahlreiche Männchen an "Hilltopping" teilnahmen (Beobachtungen von Ende August und Anfang September 1992, 1993). *H. porrecta* ist demnach ein Begleiter von Hochgebirgswäldern der Süd-Kalkalpen, Kalkkarpaten und der Hochgebirge des Balkan (Rhodopen, Olymp, Pindos) auf Kalk, wo sie besonders am Rande der Waldgrenze oder dicht über dieser lokal sogar häufig sein kann. Sie gehört zu den größten Fleischfliegen Europas (Vfl.-Länge bis 14.5 mm). Sowohl in der Originalbeschreibung als auch in der entsprechenden Skizze von Böttcher, die vielfach von anderen Autoren (Rohdendorf 1937, Séguy 1941, Povolny & Slameçková 1979) übernommen wurde, werden die Cerci als schlank und mäßig nach oben gerichtet dargestellt. In Wirklichkeit zeichnen sich sowohl Cerci als auch die ♂♂ Genitalien durch eine gewisse Variabilität aus (Abb. 13-15), die u. a. den Anlaß zur Beschreibung der Art als *Heteronychia bulgariensis* Lehrer bot. Die Grenzen dieser Variabilität können den beigefügten Abbildungen entnommen werden.

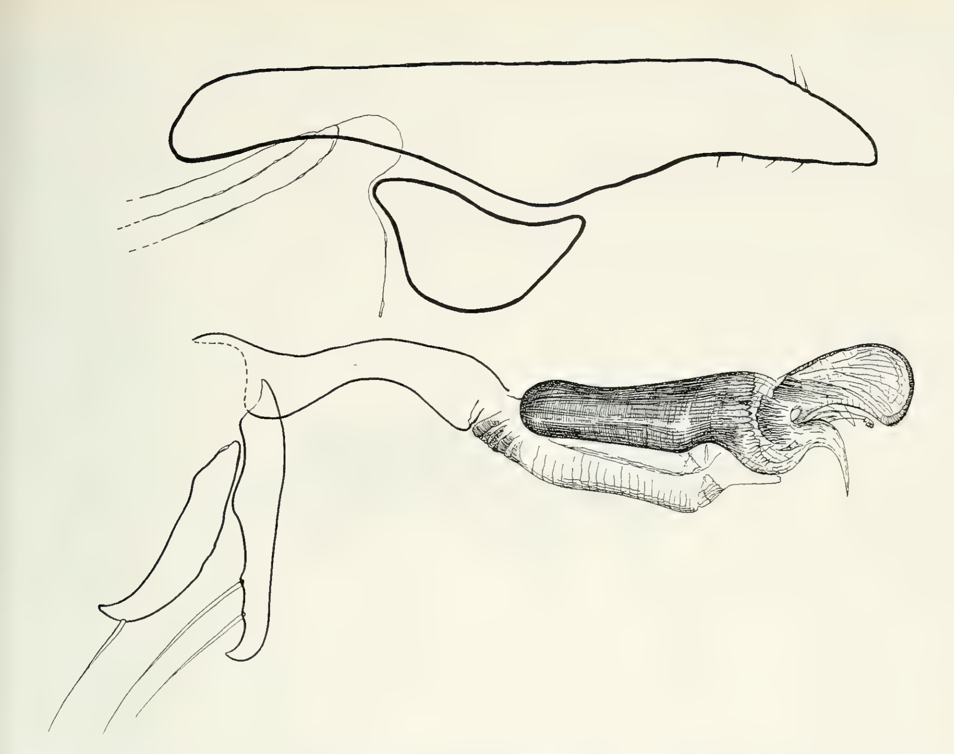


Abb. 16. *Heteronychia (Eupierretia) gigas* (Povolny). Kroatien, Podgora, Biokovo-Gebirge. 4.6.1990. Cercus und Paraphallus.

Heteronychia (Eupierretia) gigas (Povolny 1986)

Discachaeta gigas Povolny, 1986, p. 229-233.

Untersuchtes Material: (s. Povolny & Znojil 1993); große Serien von Ende Juni 1991 und Mitte Juni 1992, und Anfang Juni 1994, D. Povolny (MMB)

Ich beschrieb diese Art aufgrund einer kleineren Serie von Fliegen, die Prof. Dr. J. Vácha, Brünn, Anfang der 80er Jahre im Biokovo-Gebirge über Makarska und Podgora an der dalmatinischen Küste gesammelt hat, als ich das Gebiet persönlich nicht besuchen konnte. In den Jahren 1990-1994 konnte ich in diesem Gebiet intensiv sammeln und reichliches Fleischfliegen-Material gewinnen, das z.T. zum Anlaß einer ökologischen Untersuchung wurde (Povolny & Znojil 1993). Dabei konnte ich feststellen, daß *H. gigas* im Biokovo-Gebirge äußerst häufig, in Hilltopping-Situationen teilweise massenhaft vorkommt. Der Schwerpunkt ihres Fluges fällt in den Juni, mit fortschreitender Hitze, die für dieses Gebiet im Sommer typisch ist, nimmt ihre Populationsdichten deutlich ab. Die Art dürfte einen Biokovo-Endemismus darstellen, zumal ich sie trotz intensiver Suche in anderen Gebirgen des Balkans nie sammeln konnte. Dieses Gebirge ist auch botanisch für seine Endemismen berühmt geworden. Die äußerst charakteristischen ♂ Genitalien dieser großen Fliegenart (Abb. 16) fallen u.a. durch die blasenförmige Spitze des Paraphallus und durch den plumpen Cercus auf. Die nächstverwandte Art, *Heteronychia (Eupierretia) schnitnikovi* (Rohdendorf, 1937), ist aus Kasachstan und China bekannt, und die beiden Taxa dürften eine vikariierende Geschwisterart darstellen.

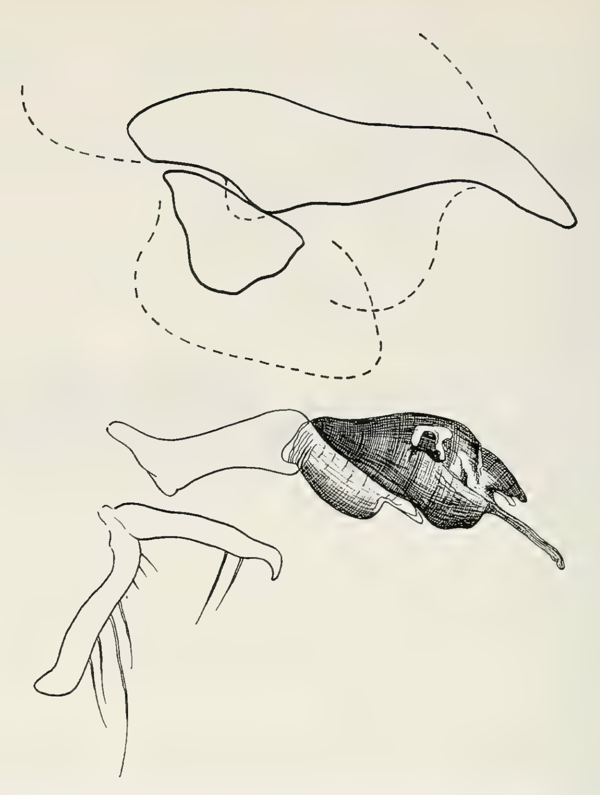


Abb. 17. *H. (E.) portschinskvana* (Rohdendorf) (*schnabli* ?). Griechenland, Thessalien, Meteora/Kalambaka, 28.5.1992. Cercus und Paraphallus.

Heteronychia (Eupierretia) portschinskyana (Rohdendorf, 1937)
Abb. 17

Pierretia (Eupierretia) portschinskyana Rohdendorf, 1937, p. 373.
Heteronychia atanassovi Lehrer, 1977, p. 31 (synonymisiert von Verves 1986).

Untersuchtes Material: Griechenland: 2♂♂, Pindos Gebirge, Vikos Aoos, 17.-19.6.1991; 2♂♂, Thessalien, Meteora (Kalambaka), 18.6.1993; 12♂♂, Paralia-Skotina (Vádí), 25.5.1992; 3♂♂, dtto, 30.5.1992; 11♂♂, dtto, 28.5.1992, 1♂, dtto, 6.6.1992; 2♂♂, 12.6.1993, D. Povolny (MMB) (übriges Material siehe Povolny & Verves 1990).

Diese charakteristische Art aus der Süd-Ukraine ist offenbar auf der Balkanhalbinsel ziemlich weit verbreitet, so in Bulgarien (Povolny & Verves 1990) und in Griechenland, wo ich sie zeitweise häufig entlang der ägäischen Meeresküste (zwischen Leptokaria und Platamon), in Thessalien (Kalambaka) und Mazedonien Nationalpark Pindos (Aoos) im Juni der Jahre 1991-1994 sammeln konnte. Sie begleitet xerotherme Habitate und ist besonders in trockenen Flußtälern und auf Kalkformationen stellenweise häufig. Bei einigen Gelegenheiten fand ich in älteren Sammlungen etliche Exemplare dieser Art, die als *Heteronychia schnabli* (Villeneuve, 1911) (bisher nur aus Korsika bekannt) bestimmt waren. In der Zoologischen Staatssammlung München befindet sich ein von Prof. Dr. H. Souza Lopes, als "*Pierretia schnabli* Villeneuve" identifiziertes ♂ aus Sizilien, bezettelt "I. K. H. Prinzessin Therese von Bayern". Dieses ♂ weist eine große Genitalähnlichkeit mit *H. (E.) portschinskyana* auf. Die Klärung der bisher mangelhaft bekannten Verbreitung von *H. portschinskyana* im Mittelmeergebiet könnte die offene Frage des (scheinbaren) Korsika-Endemismus von *H. schnabli* und somit die taxonomische Beziehung der beiden Taxa klären.



Abb. 18. *H.* (s. str.) *benaci* (Böttcher) (?). Griechenland, Paralia, Skotina-Vádí, 29.5.1991. Cercus und Paraphallus.

Heteronychia (Heteronychia) benaci (Böttcher, 1913)
Abb. 18

Sarcophaga benaci Böttcher, 1913, p 247.

Untersuchtes Material: Griechenland: 22♂♂, Paralia-Skotina (Vádí), 27.5.1992; 25♂♂, dtto, 25.5.1992; 11♂♂, dtto, 30.5.1992; 1♂, dtto, 4.6.1992; 9♂♂, dtto, 28.5.1992; Paralia Platamon, 3.6.1992, D. Povolny (MMB).

Diese Art blieb praktisch allen Autoren nach Böttcher unbekannt und gilt als große Seltenheit. Ich konnte eine größere Serie von ♂♂ in einem ausgetrockneten Vádí bei der Gemeinde Skotina bei Leptokaria unterhalb des Olymp Ende April – Anfang Juni 1992 sammeln. Vereinzelte Männchen erbeutete ich auch auf den Hügeln hinter der Burgruine von Platamon etwa 25 km südlich von Leptokaria am Fuße des Olymp. Die Fliegen saßen auf Kalkfelsen und Steinen im Sonnenschein. Beim Einsetzen der Hitzeperiode verschwanden sie. Die Art scheint demnach ein Frühlingstaxon zu sein, weil sie in dem Gebiet in späteren Saisonaspekten trotz intensiver Suche auch in beiden nachfolgenden Jahren nicht mehr beobachtet wurde. Die ♂ Genitalien haben einen charakteristischen Cercus und vor allem Paraphallus mit den beiden schlanken Goniten (Abb. 18b). Diese Abbildung ist die erste nach Böttchers mangelhafter Originalskizze, die zu Verwechslungen mit ähnlichen Taxa führen konnte.

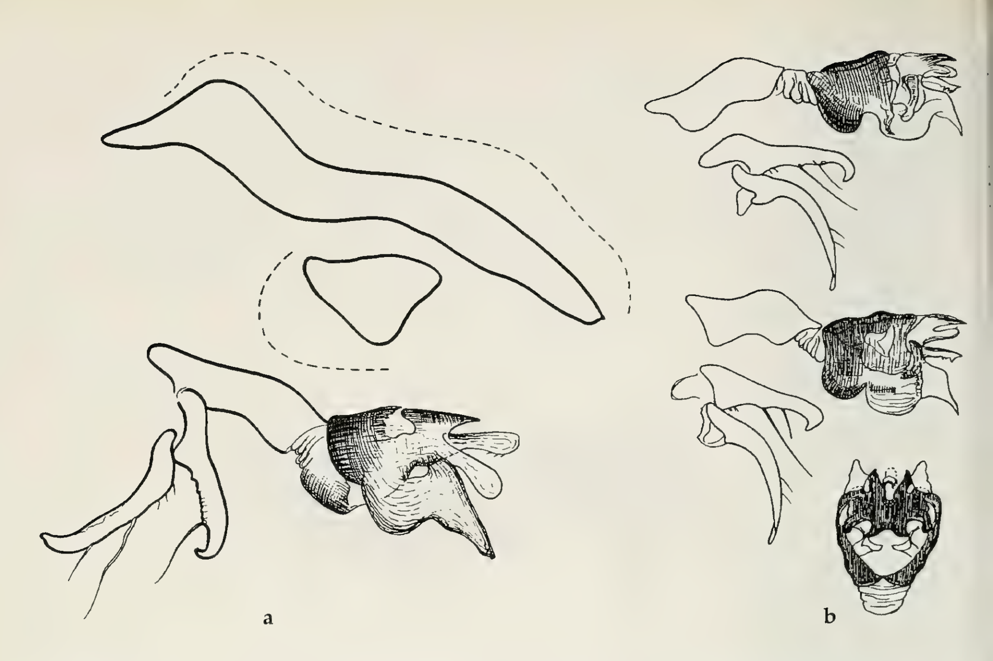


Abb. 19a. *Heteronychia* (s. str.) *ancilla* (Rondani). Griechenland, Olymp, Tal unter Kataphygion I, 4.8.1993. Cercus und Paraphallus.
Abb. 19b. *H.* (s. str.) *ancilla* (Rondani). Mähren, Kurdêjov, 14.4.1992. Zwei Varianten des Paraphallus in Lateralsicht und Paraphallusspitze in Ventralsicht.

Heteronychia (Heteronychia) ancilla (Rondani, 1865)
Abb. 19

Sarcophaga ancilla Rondani, 1865, p.231.
Heteronychia povolnyi Mihályi, 1975, p. 104 (synonymisiert von Verves 1986).
Heteronychia belanovskyi Verves, 1973, p. 946 (synonymisiert von Verves 1986).
Pierretia (Heteronychia) armeniaca Rohdendorf, 1937, p. 355-356 (**syn. nov.**).

Untersuchtes Material: Süd-Mähren: 1♂, Pálava-Tabulová hora (Pollauer Berge-Tafelberg), 11.4.1981; 2♂♂, Kurdêjov (Kurdau), 14.4.1991; Griechenland: 9♂♂, Olymp-Kataphygion I, 26.8.1993, D. Povolny (MMB).

Diese Art kommt in den Balkanländern und von der Südukraine bis Transkaukasien vor und gilt als selten. Ihre mitteleuropäische Nordgrenze erreicht sie in der Südslowakei und in Südmähren. Sie zeichnet sich durch eine beträchtliche Variabilität der Körpergröße aus, kleine Individuen gehören zu den kleinsten Fleischfliegen Europas (Vorderflügellänge 3.5 mm!), während die meisten Individuen etwa 7 mm groß sind. Die größten Individuen dieser Art (Körperlänge um 8-9 mm) sammelte ich auf dem Südhang des Olymp im Tal unterhalb Mikas etwa 200 m unterhalb Kataphygion in 1800 m Seehöhe Ende August 1993. Die kleinsten Individuen kommen bereits Ende April vor, die Art ist aber offenbar polyvoltin (wie die meisten Fleischfliegen) und fliegt bis September. Der Größenvariabilität der Fliegen entsprechen auch die scheinbaren Genitalunterschiede, so daß die Art noch als *Heteronychia belanovskyi* Verves aus der Ukraine und als *Heteronychia povolnyi* Mihályi aus Ungarn beschrieben wurde. Wie der guten Genitalskizze von Rohdendorf (1937) zu entnehmen ist, gehört auch *Pierretia (Heteronychia) armeniaca* Rohdendorf aus Armenien zu den eindeutigen Synonymen dieser weitverbreiteten, aber meist seltenen Art.

Die Art dürfte ein Vertreter des pontomediterranen Elementes sein und sie kommt lokal auf warmen Substraten, besonders auf Löß (in niedrigeren Lagen) oder auf Kalk (besonders in den südosteuropäischen Gebirgen) vor.

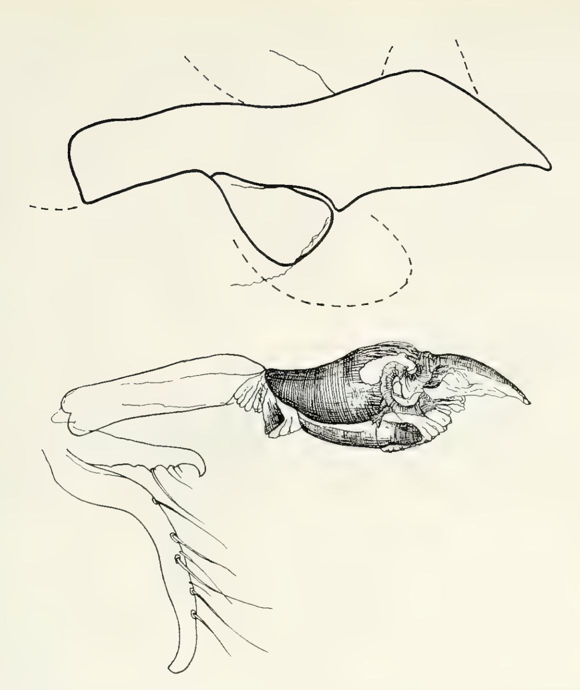


Abb. 20. *Heteronychia (Pandelleola) filia* (Rondani). Griechenland, Paralia, Platamon, 6.6.1992. Cercus und Paraphallus.

Heteronychia (Pandelleola) filia (Rondani, 1860)
Abb. 20a,b

Sarcophaga filia Rondani, 1860, p. 386.
Sarcophaga juvenis Rondani, 1860; p. 388 (synonymisiert von Verves 1986).

Untersuchtes Material: Tschechische Republik: Große Serien aus der Umgebung von Brünn (Stránská skála, Hostêrádky), Nikolsburg (Pálava, Mušov) und Znaim, gesammelt in den Jahren 1954-1993; Slowakische Republik: Große Serien aus der Süd-Slowakei (Nitra, Dražovce, Štúrovo), gesammelt in den Jahren 1954-1993. Weitere Angaben bei Povolny & Znojil (1990) und Povolny, Vácha & Znojil (1993). Griechenland: 6♂♂, Paralia Platamon, 6.6.1992, D. Povolny; vereinzelte ♂♂ gesammelt im ganzen Kalkgebiet zwischen Katarini, Leptokaria und Paralia bis zu Kokino Nero unter dem Olymp, aber auch in Thessalien (z.B. bei Kalambaka) im Mai-Juni der Jahre 1992-1993, 1994 D. Povolny (MMB).

Die Art ist mediterran-expansiv und besonders an der Nordgrenze ihres Areals stark gefährdet, was durch ihr allmähliches Verschwinden in den letzten zwei Jahrzehnten aufgezeigt wird. Sie ist ein charakteristischer Begleiter von trockenem Löß-, Kalk- oder Kreideformationen, wo sie z.T. massenhaft die Heliciden als deren Parasitoid befällt. Obwohl sie z.B. in Mitteleuropa lokal noch immer häufig vorkommt (Lößformationen Südmährens) und aus den meisten Balkanländern bekannt war (Verves 1986), war sie aus Griechenland bisher nicht nachgewiesen. Ich erbeutete z.B. am 6.6.1992 einige ♂♂ in einer Hilltopping-Situation auf dem Kalkhügel von Platamon an der ägäischen Meeresküste, ca. 25 km südlich von Leptokaria am Fuß des Olymp. Diese meditarrane Population besteht aus größeren Individuen als die meisten Populationen in (Mittel-)Europa und hat auffallend sklerotisierte, sehr charakteristische ♂ Genitalien (Abb. 20).

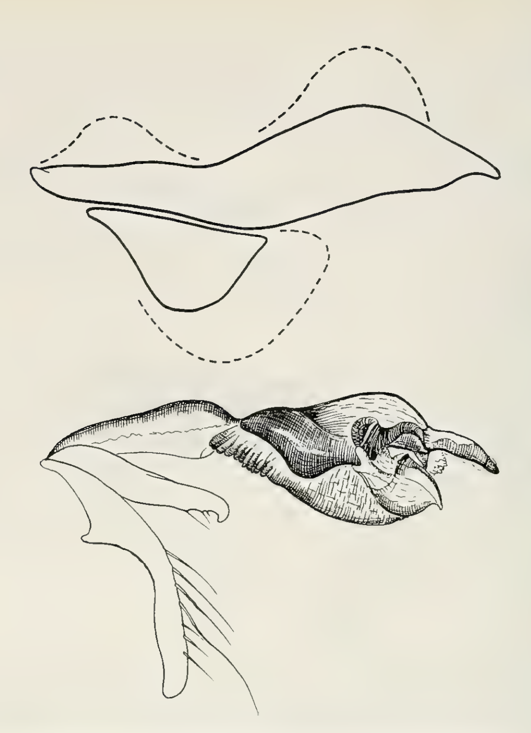


Abb. 21. *H. (P.) turana* (Rohdendorf). Iran, Keredj, Juni 1988. Cercus und Paraphallus.

Abb. 22. *Heteronychia (Pandelleola) taurica* (Rohdendorf). Österreich, Hetzkogel (Lunz), 4.7.1991. Cercus, Paraphallus und 8. Sternit.

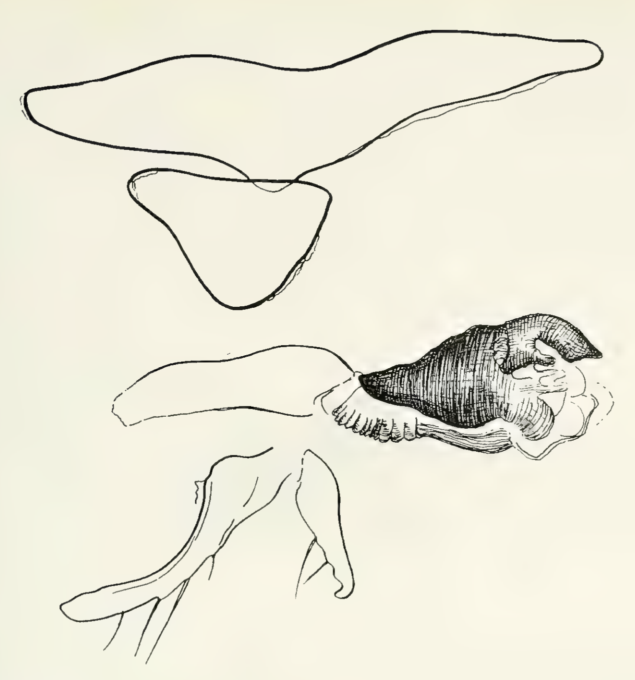


Abb. 23. *H. (P.) taurica* (Rohdendorf). Griechenland, Paralia, Platamno (Hilltop), 6.6.1992. Cercus und Paraphallus.

Heteronychia (Pandelleola) turana Rohdendorf, 1937)
Abb. 21

Pierretia (Pandelleola) filia ssp. *turana*, Rohdendorf, 1937, p. 332.

Untersuchtes Material: 4♂♂ (und wahrscheinlich 7♂♂ derselben Art), Nord-Iran, Elburz-Gebirge, Keredj, Wirte (Schnecken aus der Familie Helicidae), gesammelt im April-Mai 1988, geschlüpft im Juni 1988.

Diese Art stellt offenbar ein irano-endemisches Element dar und ist das östlichste Taxon dieser ausgeprägten Untergattung der Gattung *Heteronychia.* Sie ist bisher aus dem Nord-Kaukasus, Transkaukasus, Turkestan, Uzbekistan, Tadschikistan und dem Iran bekannt. Ihr Wirt war bisher unbekannt, mir wurden aus der Pahlavi-Universität in Teheran einige ♂♂ dieser Art zur Bestimmung geschickt, die aus terrestrischen Gastropoden, wohl Heliciden, gezüchtet wurden (Keredj, Nordiran, Juni 1988). Somit ist diese Art ein weiterer nachgewiesener Parasitoid von Schnecken. Bei einer gewissen Ähnlichkeit mit den Genitalien von *H. (P.) filia* sind die Genitalien dieser Art vor allem durch den nur kurz vorragenden Vorsprung der Paraphallusspitze gekennzeichnet (Abb. 21b).

Heteronychia (Pandelleola) taurica (Rohdendorf, 1937)
Abb. 22, 23

Pierretia (Pandelleola) taurica Rohdendorf, 1937, p. 333.

Untersuchtes Material: Österreich: 2♂♂, Lunzer Alpen, Hetzkogel, 1200 m, 4.-5.7.1991; Griechenland: 2♂♂, Paralia Platamon, 6.6.1992; 3♂♂, Paralia Skotina (Vádí), 11.-12.9.1992, D. Povolny (MMB).

Die bisher aus dem Nord-Kaukasus, Transkaukasien, Turkestan und dem Iran bekannte kleine Fleischfliegenart konnte ich sowohl für Österreich (Lunzer Alpen – Hetzkogel, 1400 m, 4.-5.7.1997) als auch für Griechenland (Platamon-Gipfel, 80 m, 6.6.1992) und somit für Mitteleuropa und für die Balkanhalbinsel nachweisen. Die Art kann wegen ihrer geringen Größe leicht übersehen werden, weil

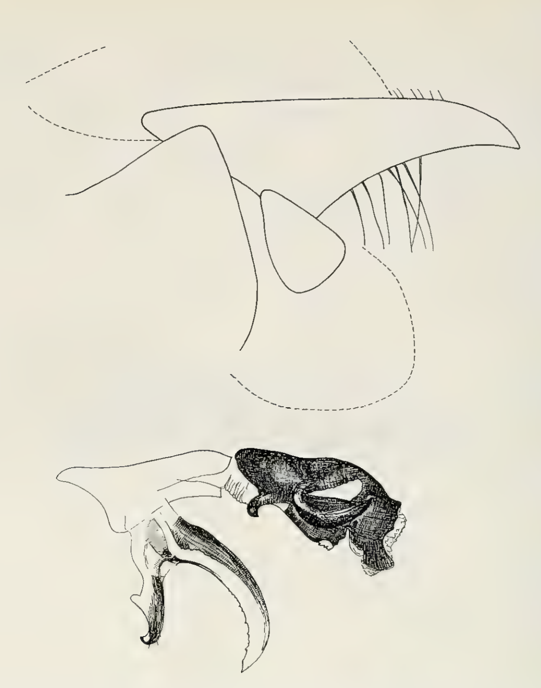


Abb. 24. *Helicophagella novercoides* morpha *novella* (Baranov). Griechenland, Paralia, Platamon (Hilltop), 6.8.1992. Cercus und Paraphallus.

sie meist gemeinsam mit *Pierretia soror* (Rond.) und *P. nigriventris* (Meig.) fliegt und mit diesen verwechselt werden kann. Sie kommt offenbar nur vereinzelt vor. Die Variabilität der ♂ Genitalien dieses Taxons kann den beigefügten Abbildungen entnommen werden (Abb. 22, 23).

Helicophagella novercoides morpha *novella* (Baranov, 1929) stat. nov.
Abb. 24

Sarcophaga novercoides Böttcher, 1913, p. 347.
Sarcophaga novella Baranov, 1929, p. 150.
Helicophagella novercoides Verves, 1986, p. 138.
Helicophagella novella (Baranov, 1929) (synonymisiert von Verves 1986).

Untersuchtes Material: Griechenland: 1♂, Thessalien, Meteora, 2.6.1992; 2♂♂, dtto, 13.6.1992: 2♂♂, Paralia Platamon, 6.9.1992; 1♂, Paralia Platamon, 14.6.1993; 2♂♂, dtto, 29.8.1993; 2♂♂, dtto, 24.8.1993; 1♂, St. Panteleimon, 27.8.1993; 1♂, dtto, 31.8.1993, D. Povolny (MMB).

Verves (1986) hat diese große Erscheinungsform aus dem *Helicophagella novercoides* (Böttcher 1913) -Komplex mit *H. novercoides* synonymisiert, betrachtet sie aber wieder als ein selbständiges Taxon (pers. Mitteilung). Mir blieb diese Form jahrelang unbekannt, bis ich sie in den letzten zwei Jahren vereinzelt wiederholt in den Kalkformationen entlang der ägäischen Küste Griechenlands sammeln konnte. Die taxonomische Problematik dieser Form sollte nur im Rahmen der Variationsbreite dieses ganzen Komplexes beurteilt werden, wozu ich bereits Stellung nahm (Povolny 1979). Der *Helicophagella novercoides*-Komplex hat seinen Schwerpunkt offenbar in den Kalkformationen der Hochgebirge Europas (Alpen, Karpaten, Balkan-Gebirge, Pyrenäen), es sind in diesen Gebirgen oft massenhaft vorkommende Fliegen. Sie sind allerdings primär außerordentlich heliophil, und schon Rohdendorf (1937) wies auf das Vorkommen dieser Art in niedrigeren Lagen der Krim und sogar in Ägypten hin. Ich konnte diese Art z.B. im Biokovo-Gebirge an der dalmatinischen Küste bei Podgora und Makarska, im

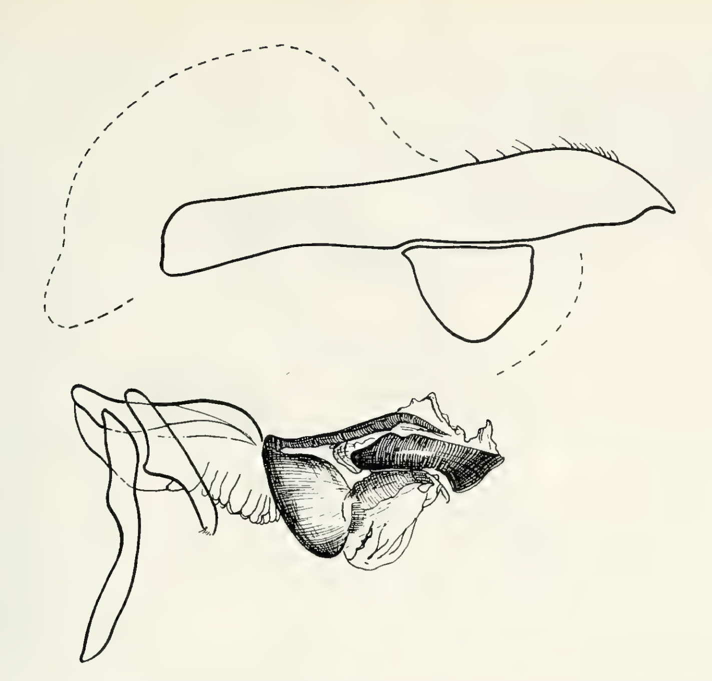


Abb. 25. *Sarcophaga novaki* Baranov. Österreich, Lunz/See, Ötscher, 15.8.1993. Cercus und Paraphallus.

nordgriechisch-makedonischen Pindos-Gebirge und im Olymp häufig sammeln (in den Alpen und Karpaten ist die Art oberhalb der Waldgrennze allgemein verbreitet), wobei ich im Frühlingsaspekt (Ende Mai – Anfang Juni) vereinzelte Fliegen auch in beträchtlich niedrigeren Lagen, selten auch nahe der Meeresküste (auf Kalkfelsen) beobachtete.Im Hoch-und Spätsommer sammelte ich in niedrigen Lagen unter dem Olymp (z.B. im trockenen Vádí bei Skotina oder bei Platamon 5-80 m NN) auffallend große Individuen (Körperlänge bis über 13 mm gegnüber der Normallänge von 8-10 mm bei Hochgebirgsindividuen), die offenbar dem Taxon *novella* Baranov, 1929 entsprechen. Die ♂ Genitalien dieser Form sind zwar entsprechend größer als diejenigen der Nominatform, aber sie zeigen gegenüber dieser nur ein einziges Unterscheindungsmerkmal: die nur schmale und deswegen kaum gefaltete Membran der Paraphallusspitze, die sonst für *Helicophagella novercoides* (s. str.) charakteristisch ist. Es war aber gerade die Entfaltung dieser Membran, die zu etlichen Synonymen führte (Povolny 1979, Verves 1986). Unter diesen Umständen stellt die Form *novella* nur den Extremfall einer Rückbildung dieser Membran dar, wobei dieses Merkmal nach meiner Meinung höhenabhängig ist. Die eindeutige Abgrenzung von *novella* und *novercoides* bleibt nach wie vor problematisch. Die auffallende Größe der Fliegen dieser Form und auch ihre großen Genitalien mit der reduzierten Paraphallusmembran dürften deswegen als eine Ökomorphe dieses Artkomplexes interpretiert werden. Der Nachweis der eventuellen artspezifischen Selbständigkeit von *novella* Baranov kann daher nur experimentell geführt werden, nicht jedoch durch eifache Beobachtung im Gelände.

Sarcophaga novaki Baranov, 1941

Abb. 25-28

Sarcophaga novaki Baranov, 1941, p. 397.
Sarcophaga hennigi Lehrer, 1978, p. 127 (synonymisiert von Verves 1986).

Untersuchtes Material: Österreich, Lunzer Alpen: 1♂, Hetzkogel, 1200 m, 5.7.1991; 4♂♂, dtto, 20.7.1991; 3♂♂, dtto, 20.8.1991; 4♂♂, dtto, 22.8.1991; 11♂♂, Sattel über dem See, 850 m, 14.6.1992; 1♂, Hetzkogel, 15.6.1992; 10♂♂, dtto,

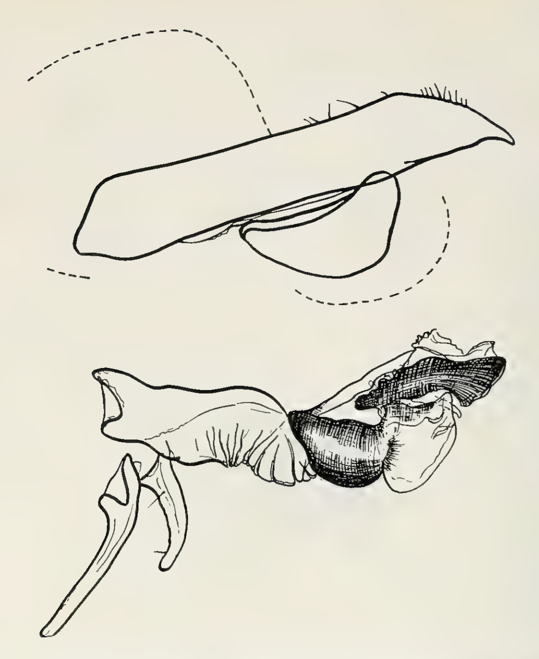


Abb. 26. *S. novaki* Baranov. Österreich, Lunzer Alpen, Hochkar, 14.8.1993. Cercus und Paraphallus.

27.7.1992; 11♂♂, dtto, 4.-5.7.1992; 6♂♂, dtto, 1.7.1992; 12♂♂, dtto, 2.8.1992; 5♂♂, Sattel über dem See, 20.8.1992; 16♂♂, Hochkar, 14.8.1993; 23♂♂, Ötscher, 15.8.1993, D. Povolny (MMB).

Diese mangelhaft bekannte und scheinbar seltene Art wurde aus den Bergen um Split in Kroatien beschrieben und später aus der Umgebung von Salzburg gemeldet (als *S. hennigi* Lehrer, die ein Synonymum ist). Ich konnte während meiner Forschungen in Österreich feststellen, daß sie ein Begleiter der alpinen Waldzone der nördlichen Kalkalpen ist, wobei sie von etwa 800 m NN bis über die Waldgrenze (über 1800 m NN) steigt und besonders im Hochsommeraspekt (August) ziemlich häufig (dominant bis subdominant) in Hilltopping-Aggregationen (z.B. Umgebung von Lunz, wie Hetzkogel, Hochkar, Ötscher, Dürnstein) vorkommt. Einzelne Exemplare dieser Art entdeckte ich auch in den alten Aussammlungen von Fleischfliegen (vom Ende des 19. bis Anfang des 20. Jahrbunderts) aus der Steiermark im Tiroler Landesmuseum Ferdinandeum, Innsbruck.

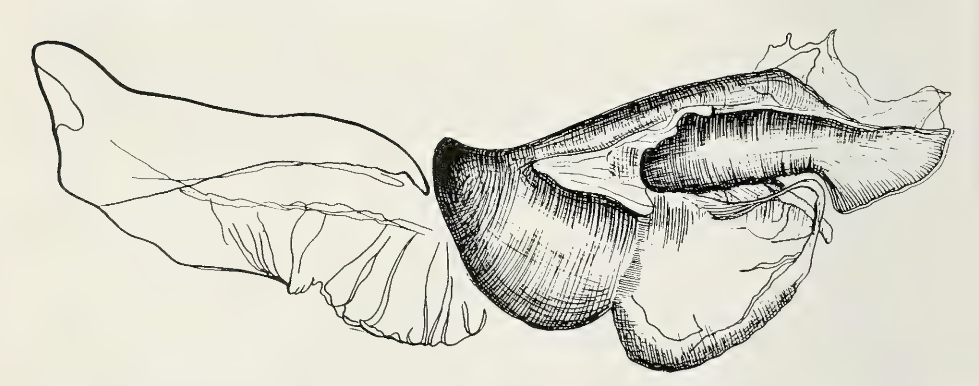


Abb. 27. *Sarcophaga novaki* Baranov. Österreich, Lunz/See, Ötscher, 15.8.1993 Paraphallusspitze lateral, Detail.

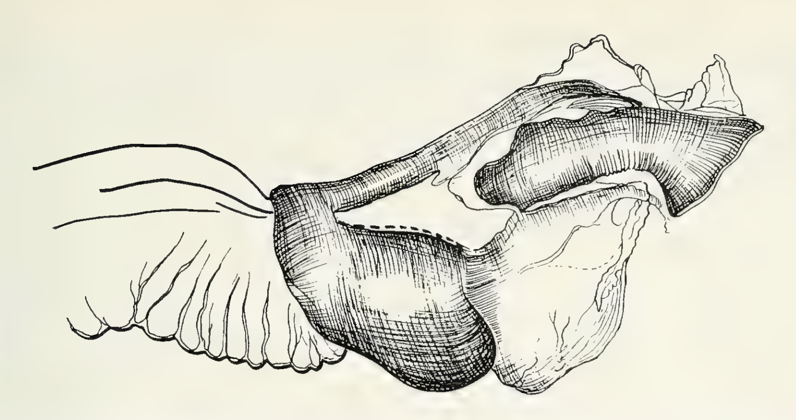


Abb. 28. *S. novaki* Baranov. Österreich, Lunzer Alpen, Hochkar, 14.8.1993. Paraphallusspitze lateral, Detail.

Die Art nimmt genitalmorphologisch eine Zwischenstellung zwischen *Sarcophaga zumptiana* Lehrer, 1959 und *S. bachmayeri* Lehrer, 1978 ein, die als endmische Arten der Karpaten die dortige Eichenwald- bzw. Buchenwaldzone begleiten. *Sarcophaga novaki* vertritt diese beiden Taxa in der mittleren Waldstufe der Kalkalpen. Morphologisch ist sie durch die kammförmige Dorsalmembran der Paraphallusspitze der *S. zumptiana*, in der Form des ventralen Membranalfortsatzes der *S. bachmayeri* ähnlich (Abb. 27, 28). Bei mangelnder Aufmerksamkeit oder Kenntnis ist die Verwechslung dieser Art mit *Sarcophaga carnaria* (Linnaeus, 1758) möglich. Interessant ist, daß die beiden letztgenannten Taxa einander ökologisch ausschließen, so daß *S. carnaria* in typischen Habitaten von *S. novaki* fast ganz zu fehlen scheint. Da es sich um Regenwurmparasiten handelt, dürfte dieses Phänomen eine Konkurrenzerscheinung sein.

Dank

Die Untersuchung des Fleischfliegenmaterials der Zoologischen Staatssammlung, München, während eines einmonatigen Studienaufenthaltes in dieser Institution im Oktober 1993 auf Grund einer Einladung des Deutschen Akademischen Austauschdienstes, Bad Godesberg, ermöglichte mir die Schlußfassung dieses Beitrages. Dabei wurde ich von der Leitung und vom Personal dieses Institutes großzügig unterstützt. Mein besonderer Dank gebührt den Herren Dr. Hubert Fechter und Dr. Friedrich Reiss, die meine Betätigung in der Zoologischen Staatssammlung vielseitig unterstützten. Herr Wolfgang Schacht bot mir unentbehrliche Hilfe in der Dipterensammlung und darüberhinaus. Die Schriftleitung der Institutszeitschrift SPIXIANA, vor allem Herr Dr. Matin Baehr, leistete mir unschätzbare Hilfe während der Vorbereitung dieses Beitrages.

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Nachtrag

Während des Druckes dieser Arbeit stellte sich heraus, daß

1. Die in diesem Beitrag als *Heteronychia (Heteronychia) benaci* (Böttcher, 1913) angeführte Art in Wirklichkeit ein unbekanntes Taxon darstellt, das mit *H. (H.) benaci* (Bött.) nichts zu tun hat. Ihre Neubeschreibung erfolgt in Klapalekiana (Prag), N.S., 1994, **30**: 178-190, die gerade erscheint.

2. *Helicophagella novella* (Baranov, 1929) eine selbständige Art darstellt, die in den (Kalk)Gebirgen der Alpen und Karpaten vorkommt. Die auf der Abb. 24 dargestellten männlichen Genitalien haben aber mit *H. novella* (Bar.) nichts zu tun. Der ganze Fragenkomplex um *Helicophagella novercoides* (Böttcher, 1913) stellt offenbar eine komplizierte taxonomische Frage dar, der noch spezielle Aufmerksamkeit gewidmet werden sollte.

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New Triassic Mesorthopteridae

(Insecta, Plecopteroidea, Grylloblattida)

By **Sergey Storozhenko**

Storozhenko, S. (1996): New Triassic Mesorthopteridae (Insecta, Plecopteroidea, Grylloblattida). – Spixiana **19/1:** 115-127

New Triassic taxa of the family Mesorthopteridae from Central Asia are described and a key to the genera of the family is given. New taxa: *Parastenaropodites*, gen. nov.; *P. fluxa*, spec. nov.; *P. longiuscula*, spec. nov.; *P. nervosa*, spec. nov.; *Mesorthopterina*, gen. nov.; *M. pulchra*, spec. nov.; *M. bona*, spec. nov.; *Austroidelia asiatica*, spec. nov.; *Mesoidelia*, gen. nov.; *M. ignorata*, spec. nov.; *M. faceta*, spec. nov.; *M. semota*, spec. nov.

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Introduction

The family Mesorthopteridae is known from two species of the genus *Mesorthopteron* Tillard, 1916 from the Upper Triassic of Australia and South Africa (Tillard 1916, 1922, Riek 1974) and one species of the genus *Austroidelia* Riek, 1954 from the Upper Triassic of Australia (Riek 1954, Rasnitsyn 1980). The present study is based on the rich collection of the Paleontological Institute of the Russian Academy of Sciences, Moscow. This material was collected by the expeditions of the Laboratory of Paleoentomology of the Paleontological Institute from two well-known Triassic localities: Madygen in the South Ferghana region of Kirghizia and Kizyl-Tam in the Ketmenky Mts., Kazakhstan. Unfortunately imprints from Madygen are distorted by postsedimentational deformation of rock and therefore length of wings is calculated by a method proposed by A. Rasnitsyn (1982).

Family Mesorthopteridae Tillard, 1922

Diagnosis. Body slender. Head small, narrower than pronotum. Antennae multisegmented. Pronotum elongate, broadened posteriorly; with distinct paranota. Legs unmodified, femur and tibia without spines; tarsus 5-segmented, apical segment of tarsus with two claws and large arolium between them. Cerci multisegmented. Last tergite large. Last sternite of female with triangular posterior margin. Ovipositor relatively short, stout. Fore wing membranous or slightly coriaceus, without hairs. The subcosta (Sc) terminating on costa (C) near apical third or quarter of wing; costal area from broad to narrow, with numerous simple veinlets or without veinlets. The radius (R) strongly convex, extending well to the apex of wing, simple or with 3-6 branches near the apex. Its sector (RS) arising before the middle of wing, with 3-12 branches directed upwards or to the apex of wing. The base of media (M) is deposited between R and CuA or closely related to R; M divided on a main anterior convex branch (MA) and main posterior concave branch (MP), which is complitely sclerotized or desclerotized near the middle. CuA with 5-24 branches; all branches reaching the wing margin. CuP simple, straight, weak and strongly concave. A1 and A2 simple or branched. Archediction or simple cross-veins present in all areas. Hind wings with or without anastamoses between RS and MA. M fused shortly with CuA in basal part. CuA with two branches. A1 simple, desclerotized. A2 strongly pectinate. Anal area large.

Genera included. Five genera from the Triassic of Central Asia, South Africa and Australia, three of them are described below.

Relations. The family Mesorthopteridae is closely related to Ideliidae, but distinguished in that all branches of CuA reach the fore wing margin and by very narrow area between CuA and CuP.

Key to genera of Mesorthopteridae

1. Fore wing with simple cross-veins in almost all areas, exept radial and anal areas .... 2.
– Fore wing with archedictyon in all areas .... 3.

2. M forks proximally to origin of RS. CuA with 8-12 branches .... *Parastenaropodites*, gen. nov.
– M forks distally to origin of RS. CuA with 18-24 branches .... *Mesorthopterina*, gen. nov.

3. Main stem of CuA giving off anteriorly a series of about six anterior branches, very regularly arranged, most of which fork dichotomically; total number of branches of CuA is 16-17. (Two species from Upper Triassic of Australia and South Africa) .... *Mesorthopteron* Tillard, 1916
– Main steam of CuA giving of a series of irregularly arranged branches; CuA with 5-11 branches .... 4.

4. Costal area very broad, its width 3.3-4.2 times less than width of wing ..... *Austroidelia* Riek, 1954
– Costal area relatively narrow, its width 7.1-13.5 times less than total width of wing .... *Mesoidelia*, gen. nov.

Parastenaropodites, gen. nov.

Type species: *Parastenaropodites fluxa*, spec. nov. Middle or Upper Triassic of Kirghizia.

Description

Body slender. Head small, antennae multisegmented. Pronotum elongate, broadened posteriorly. Legs unmodified, femur and tibia without spines; tarsus 5-segmented, apical segment of tarsus with two claws and large arolium between them. Cerci multisegmented. Last tergite large. Last sternite, or subgenital plate, of female with triangular posterior margin. Ovipositor relatively short, stout.

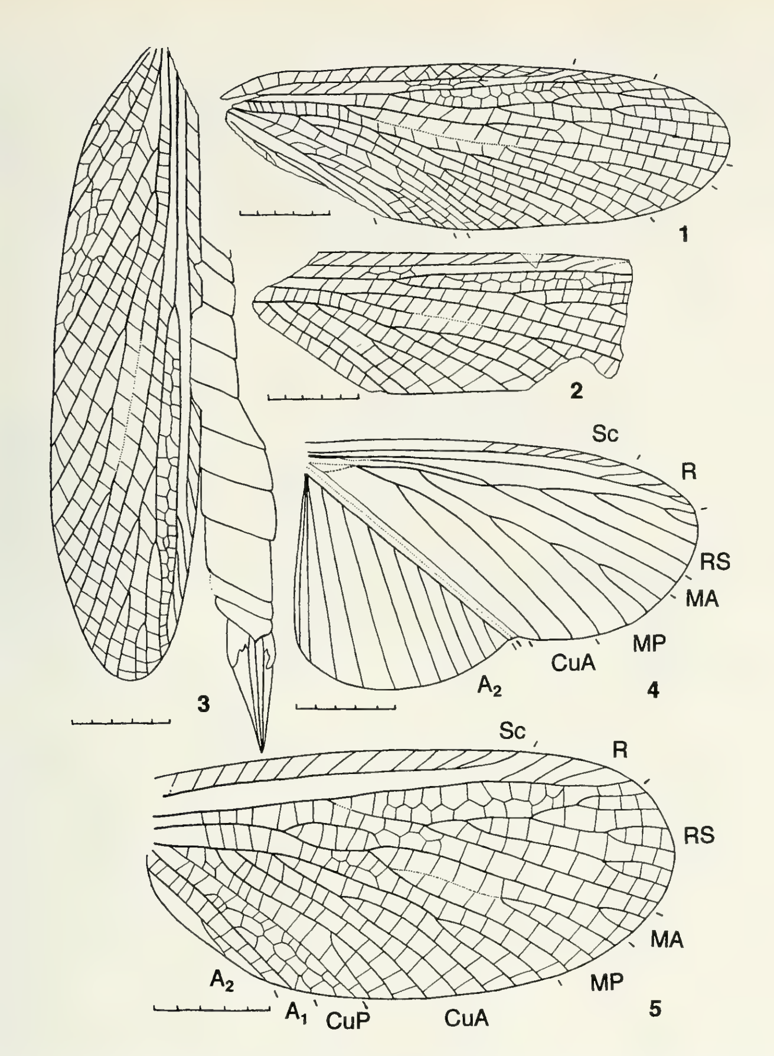
Fore wing membranous, without hairs. Sc terminating on C near apical third or quarter of wing; costal area from broad to narrow; with numerous simple veinlets. R simple, with 3-6 mostly simple veinlets. RS with 5-12 branches directed upwards or to the apex of wing. The main fork of M proximal to origin of RS; MA simple or with 2-3 branches; MP simple or with 2-7 branches, complitely sclerotized or desclerotized near the middle. The base of M in proximal third of wing has an intermediate position between R and CuA. CuA with 5-12 branches; all branches reaching the wing margin. CuP simple, straight, weak. Cross-veins simple in most areas; in subcostal, radial and anal areas cross-veins forming a row of two cells. A1 and A2 simple or branched.

Species included. Three species from the Middle or Upper Triassic of Central Asia.

Key to the species of *Parastenaropodites*

1. MP with 5-7 branches .... *P. nervosa*, spec. nov.
– MP simple or with 2-3 branches .... 2.

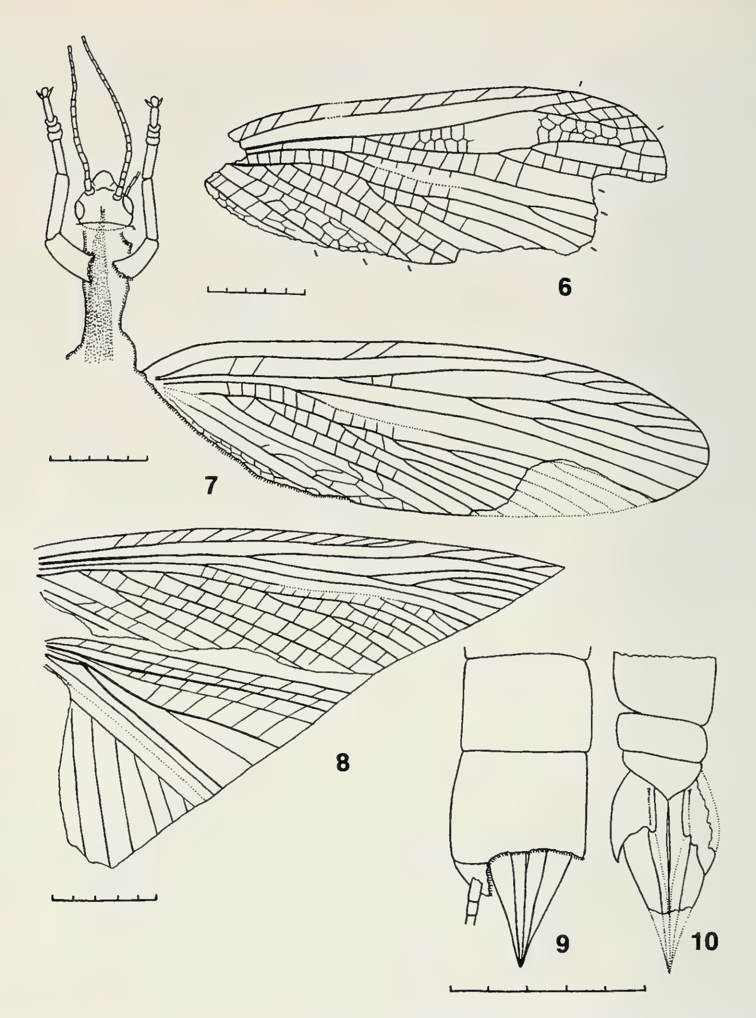
2. Fore wing dark with light stripes across main longitudinal veins. Radial area narrower than costal area. Costal area 1.8-2.5 times broader than subcostal area .... *P. longiuscula*, spec. nov.
– Fore wing light, without stripes. Radial area broader than costal area. Costal area as broad as subcostal area .... *P. fluxa*, spec. nov.



Figs 1-5. *Parastenaropodites fluxa*, spec. nov. 1. Fore wing, holotype, spec. No 2555/985. 2. Fore wing without basal and apical parts, paratype, spec. No 2240/1932. 3. Fore wing and abdomen of female, paratype, spec. No 2785/2104. 4. Hind wing, paratype, spec. No 2785/2125. 5. Fore wing, paratype, spec. No 2069/1338. For abbreviations see text. Scales: 5 mm.

Parastenaropodites fluxa, spec. nov.
Figs 1-10

Types. Holotype: Imprint and counter-imprint of fore wing, specimen No 2555/985; Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counter-imprints of body and wings or isolated fore and hind wing, specimens No 2069/1388, 2069/1489, 2069/1576, 2069/1663, 2069/1697, 2069/1716, 2069/1758, 2069/1779, 2069/1786, 2069/1792, 2069/1803, 2069/1817, 2069/1823, 2069/1824, 2069/1873, 2240/1850, 2240/1856, 2240/1860, 2240/1861, 2240/1928, 2240/1931, 2240/1932, 2240/1951, 2240/2031, 2240/2058, 2240/2060, 2240/2068, 2240/2120, 2240/2125, 2555/789, 2555/842, 2555/906, 2555/911, 2785/2102, 2785/2104, 2785/2108, 2785/2110, 2785/2114, 2785/2116, 2785/2125, 2785/2130, 2785/2132, 2785/2134,



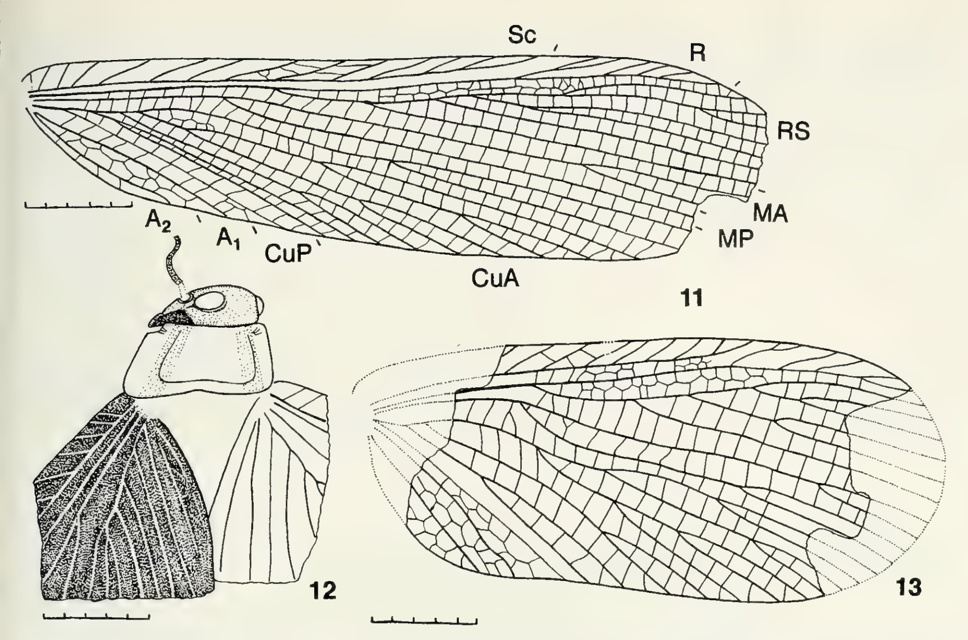
Figs 6-10. *Parastenaropodites fluxa*, spec. nov. 6. Fore wing, paratype, spec. No 2240/1951. 7. Head, legs and fore wing, paratype, spec. No 2555/911. 8. Fore and hind wings, paratype, spec. No 2785/2131. 9, 10. Apex of female abdomen, paratype, spec. No 2785/2176. 9. Dorsal view. 10. Ventral view. Scales: 5 mm.

2785/2143, 2785/2151, 2785/2158, 2785/2165, 2785/2176, 2785/2181, 2785/2185, 2785/2186, 2785/2188, 2785/2189 & 2785/2197, 2785/2192, 2785/2203, 2785/2216, 2785/2217, 2785/2218, 2785/2220, 2785/2221, 2785/2226, 2785/2227, 2785/2236, 2785/2238, 2785/2239, 2785/2254, and 2785/2258 from same locality.

Description

Body slender. Head considerably shorter than pronotum. Pronotum large, elongate, widened posteriorly, with broad patanota. Ovipositor straight.

Fore wing with broadly rounded apex. Costal area narrow, with series of 11-17 simple veinlets; ratio of its width to maximum width of wing 10-14. Subcostal area relatively broad, equal or 1.1-1.3 times broader than width of costal area. R with 3-5 veinlets near apex of wing. RS originating in basal third of wing or slightly proximally, with 5-7 branches directed to anterior margin and apex of wing. Maximum width of radial area 1.5-2.5 times more than width of costal area. M forks before the origin



Figs 11-13. *Parastenaropodites longiuscula*, spec. nov. 11. Fore wing, holotype, spec. No 2785/2150. 12. Head, pronotum and wings, paratype, spec. No 2069/1840. 13. Fore wing, paratype, spec. No 2785/2175. Scales: 5 mm.

of RS; MA simple or with 2 branches; in specimen No 2069/1388 and 2785/2134 MA anastomosed with MP, in specimens No 2785/2114 and 2785/2181 MA anastomosed with RS. MP simple or with 2-3 branches, desclerotized near the middle. CuA with 5-8 branches. A1 simple or with 1-4 branches. A2 simple or with 2-3 branches. Cross-veins simple in most areas, but forming a row of two cells in radial area; in anal area cross-veins mostly irregular. Fore wing light, without any spots or stripes.

Hind wing with rounded apex. Costal and subcostal areas narrow; radial area relatively broad, 1.4-1.7 times broader than costal area. RS with 4-5 branches, in specimen No 2785/2125 RS anastomosed with MA. M fused shortly with CuA near base. CuA with 2 branches; CuP simple. Anal lobe enlarged. A1 weakly sclerotized. A2 with 11 branches, pectinate. Hind wing light.

Length of body 30-35 mm, length of pronotum 5-6.5 mm, length of fore and hind wings 25-30 mm, length of ovipositor 4.5-5 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Parastenaropodites longiuscula, spec. nov.

Figs 11-13

Types. Holotype: Imprint and counter-imprint of fore wing, specimen No 2785/2150; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counterimprints of head, pronotum and wing, specimens No 2069/1434, 2069/1671, 2069/1692, 2069/1728, 2069/1840, 2069/1870, 2240/2042, 2240/2081, 2555/887, 2555/983, 2785/2103, 2785/2112, 2785/2119, 2785/2175, 2785/2235, 2785/2244 from same locality.

Description

Head relatively small, narrower than pronotum. Pronotum widened posteriorly, with broad patanota. Head dark, pronotum light, with two longitudinal dark stripes.

Fore wing large, with broadly rounded apex. Costal area relatively narrow, with series of 12-14

simple veinlets; ratio of its width to maximum width of wing 6.1-9.3. Subcostal area narrow, its width 1.1-1.3 times less than width of costal area. R with 5-6 veinlets near apex of wing. RS originating in basal third of wing with 6-7 branches. Maximum width of radial area 1.1-1.65 times less than width of costal area. M forks before the origin of RS; MA with 2 branches; MP simple or with 2-3 branches, desclerotized near the middle. CuA with 9-11 branches. A1 and A2 simple. Cross-veins simple in most areas, but forming a row of two cells in subcostal, radial and anal areas. Fore wing dark, with light stripes across main veins. Length of fore wing 30.5-38 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Parastenaropodites nervosa, spec. nov.

Figs 14-17

Types. Holotype: Imprint of fore wing, specimen No 2240/2123; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counterimprints of fore and anterior margin of hind wing, specimens No 2069/1577, 2069/1706, 2069/1707, 2555/668, 2785/2105, 2785/2106, 2785/2159 and 2785/2230 from same locality.

Description

Fore wing large, with broadly rounded apex. Costal area broad, with series of 13-15 mostly simple veinlets; ratio of its width to maximum width of wing 3.8-5.4. Subcostal area narrow, its width 2-3.5 times less than width of costal area. R with 2-5 oblique veinlets near apex of wing. RS originating in basal third of wing with 7-12 branches directed to anterior margin and apex of wing. Maximum width of radial area 1.9-2.4 times less than width of costal area. M forks before the origin of RS; MA simple or with 2-3 branches; MP with 5-7 branches, desclerotized near the middle; in specimen No 2069/1707 proximal branch of MP anastomosed with distal branch of CuA. CuA with 8-11 branches. Cross-veins simple in most areas, but forming a row of two cells in subcostal and radial areas. Fore wing dark, with light stripes across main veins. Anterior margin of hind wing similar with fore wing, but costal area narrower. Subcostal area 1.8 times narrower than costal area. Maximum width of radial area 2.5 times less than width of costal area. Length of fore and hind wing 35-42 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Mesorthopterina, gen. nov.

Type species: *Mesorthopterina pulchra*, spec. nov.; Upper Triassic of Kazakhstan.

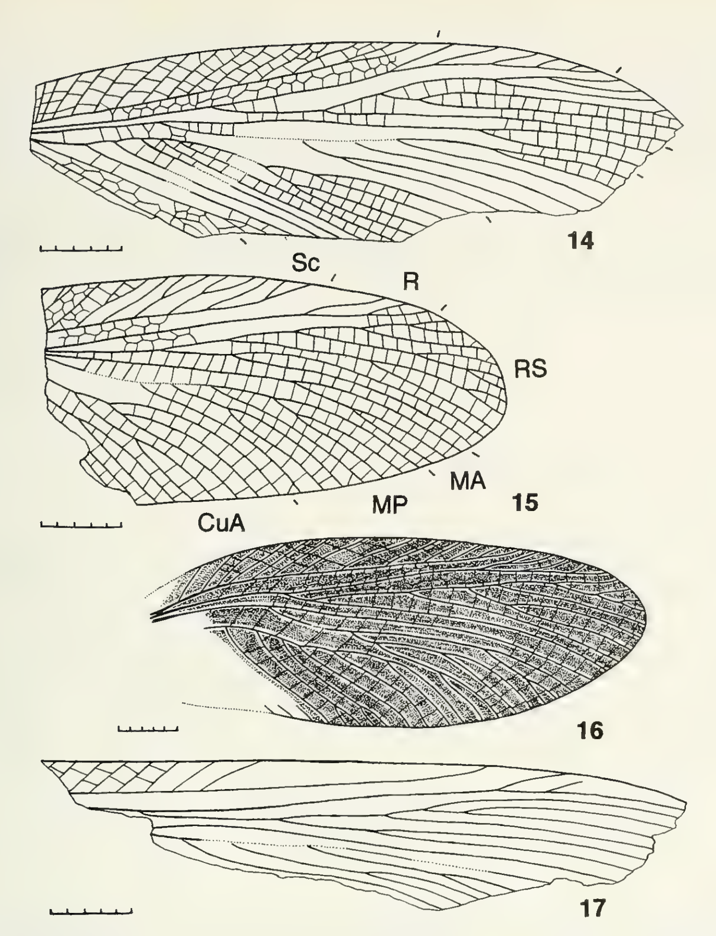
Description

Fore wing slightly coriaceus, without hairs. Sc terminating on C; costal area broad, 1.7-3.3 times broader than maximum width of radial area; with numerous partly branched veinlets. R simple; RS at least with 3 branches. M fork distally to origin of RS. The base of M closely related to R in proximal third of wing. CuA with 18-24 branches; CuA-CuP area narrow, without branches of CuA directed to CuP. CuP simple, straight, weak. Cross-veins simple in most areas, but forming rows of two irregular cells only in radial and M-CuA areas.

Species included. Two species from the Upper Triassic of Kazakhstan.

Key to the species of *Mesorthopterina*

1. Costal area of fore wing very broad, its width 3.5-3.8 times less than total width of wing; veinlets in costal area mostly branched .... *M. pulchra*, spec. nov.
– Costal area of fore wing broad, its width 6.8 times less than total width of wing; veinlets in costal area mostly simple .... *M. bona*, spec. nov.



Figs 14-17. *Parastenaropodites nervosa*, spec. nov. 14. Fore wing, holotype, spec. No 2240/2123. 15. Fore wing, paratype, spec. No 2555/668. 16. Fore wing, paratype, spec. No 2785/2106. 17. Hind wing, paratype, spec. No 2069/1707. Scales: 5 mm.

Mesorthopterina pulchra, spec. nov.

Figs 18, 19

Types Holotype: Imprint and counter-imprint of fore wing without apical half and anal area, specimen No 1361/162; Kazakhstan, Ketmensky Mts., Kizyl-Tam; Upper Triassic, Tologoiskian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counter-imprints of fragment of fore wing, specimen No 1361/161 and 1361/156 from same locality.

Description

Fore wing probably broad. Costal area with mostly branched veinlets. Subcostal area narrow, its width 6.0-6.5 times less than width of costal area. CuA with 20-24 branches. Fore wing dark, without any spots or stripes. Length of fore wing probably about 55-60 mm.

Locality and horizon. Kazakhstan: Kizyl-Tam; Upper Triassic, Tologoiskian Stage.

Mesorthopterina bona, spec. nov.
Fig. 20

Holotype: Imprint and counter-imprint of fore wing without apical part and anal area, specimen No 1361/157; Kazakhstan, Ketmensky Mts., Kizyl-Tam; Upper Triassic, Tologoiskian Stage (Paleontological Institute, Moscow).

Description

Fore wing relatively narrow. Costal area with mostly simple veinlets. Subcostal area relatively broad, its width 3.1 times less than width of costal area. R simple, in apical part with simple veinlets directed to anterior margin of wing; Rs at least with 3 branches. MA at least with 2 branches. CuA with 18 branches. Fore wing dark, without any spots or stripes. Length of fore wing probably about 45-50 mm.

Locality and horizon. Kazakhstan: Kizyl-Tam; Upper Triassic, Tologoiskian Stage.

Austroidelia Riek, 1954

Type species: *Austroidelia perplexa* Riek, 1954; Upper Triassic of Australia.

Redescription

Head narrower than pronotum. Pronotum widened posteriorly, with broad paranota. Fore wing slightly coriaceus, without hairs. Sc terminating on C near apical third of wing; costal area broad, 3.5-3.6 times broader than maximum width of radial area; with 13-19 simple veinlets. R dichotomous, with 4 branches directed to anterior margin of wing. RS with 4-5 branches directed to the apex of wing. M forks proximally to origin of RS; MP simple, complitely sclerotized. The base of M closely related to R in proximal third of wing. CuA stout in basal quarter, with 8-11 branches; all branches reaching the wing margin. CuP simple, straight, weak. Large archedictyon present, but in apical third of wing cross-veins forming rows of two cells in most areas. Anal area short and narrow.

Species included. Two species from Triassic.

Key to the species of *Austroidelia*

1. Width of costal area 4.2 times less than the total width of wing. The main fork of MA distal to main fork of RS .... *A. perplexa* Riek, 1954
– Width of costal area 3.3-3.7 times less than total width of wing. The main fork of MA proximal to main fork of RS .... *A. asiatica*, spec. nov.

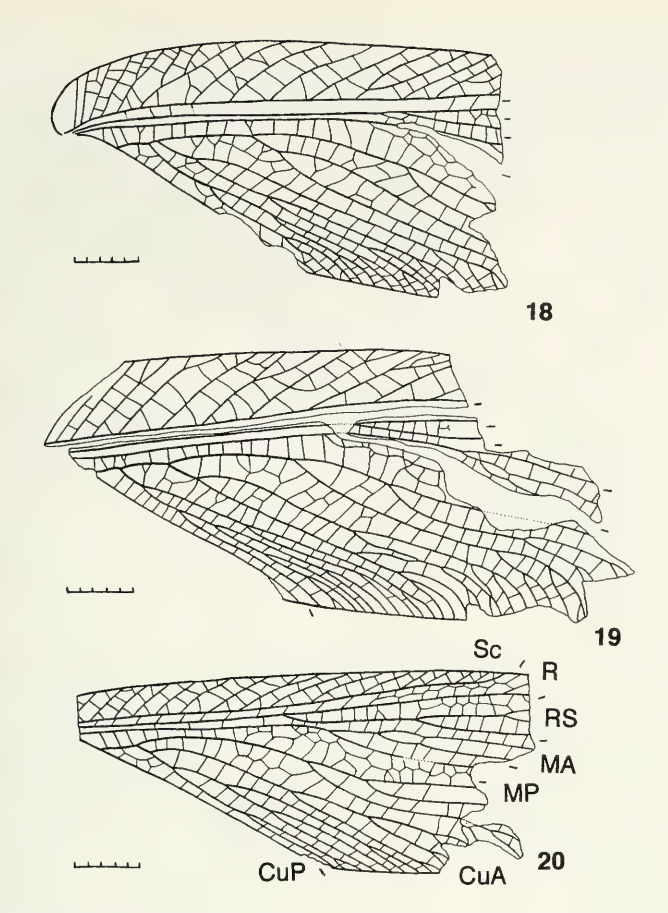
Austroidelia asiatica, spec. nov.
Figs 21-24

Types. Holotype: Imprint of fore wing, specimen No 2785/2253; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counter-imprints of pronotum and fore wing, specimens No 2069/1411, 2240/1828, 2240/1913, 2555/993, 2555/697 from same locality.

Description

Fore wing medium-size, with broadly rounded apex. Costal area broad; ratio of its width to maximum width of wing 3.3-3.7. Subcostal area very narrow, 5.0-6.2 times less than width of costal area. RS originating before the middle of wing. Maximum width of radial area 3.5-3.6 times less than width of costal area. MA with 2-6 branches. A1 simple, A2 with 2-3 branches. Fore wing light, without spots or stripes. Length of fore wing 26-32 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.



Figs 18-20. Fore wings of *Mesorthopterina*. 18, 19. *M. pulchra*, spec. nov. 18. Holotype, spec. No 1361/162. 19. Paratype, spec. No 1361/161. 20. *M. bona*, spec. nov., holotype, spec. No 1361/157. Scales: 5 mm.

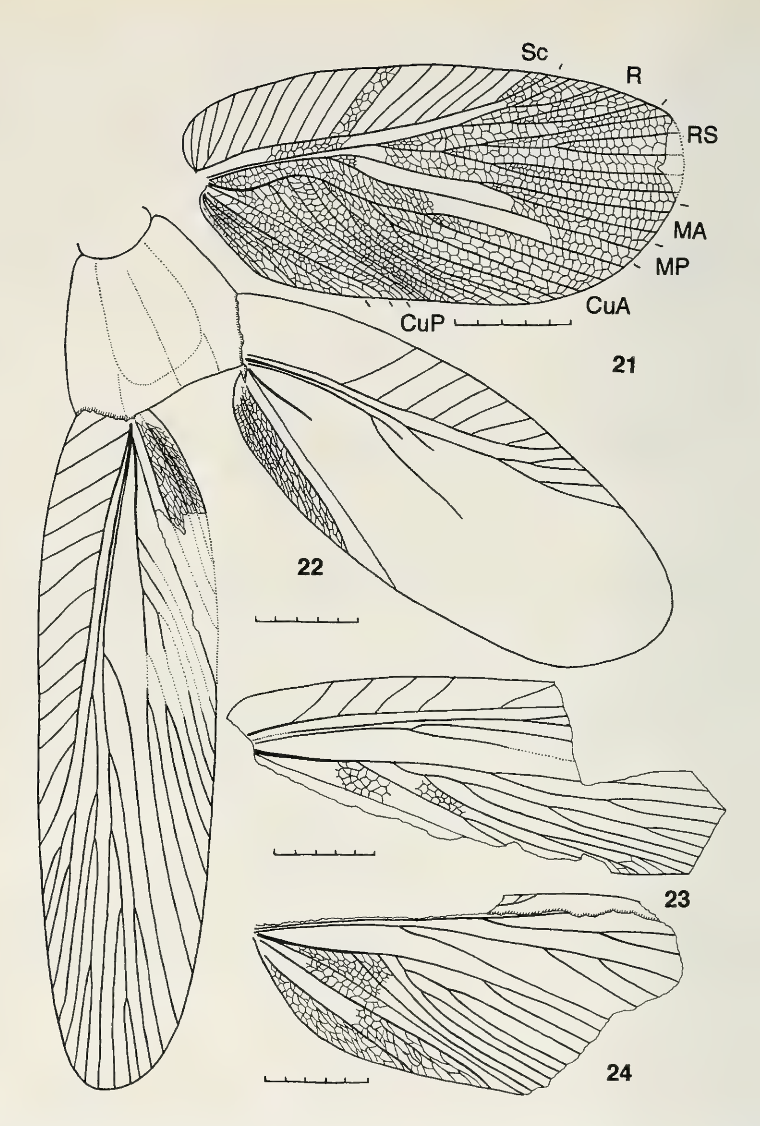
Mesoidelia, gen. nov.

Type species. *Mesoidelia ignorata*, spec. nov.; Middle or Upper Triassic of Kirghizia.

Description

Pronotum widened posteriorly, with broad paranota. Fore wing membranous, without hairs. Sc terminating on C near apical third or quarter of wing; costal area narrow: equal, 1.1-1.3 times broader or 1.6 times narrower than maximum width of radial area; without veinlets or only with indistinct ones. R simple, in apical half S-shaped; RS with 3-5 branches directed upwards. M forks proximally to origin of RS; MP desclerotized near the middle, simple or with short fork near apex of wing. The base of M closely related to R or placed between R and CuA in proximal third of wing. CuA with 5-9 branches; all branches reaching the posterior margin of wing; CuA-CuP area narrow, without branches of CuA directed to CuP. CuP simple, straight, weak. Large archedictyon present in all areas. Anal area short and narrow.

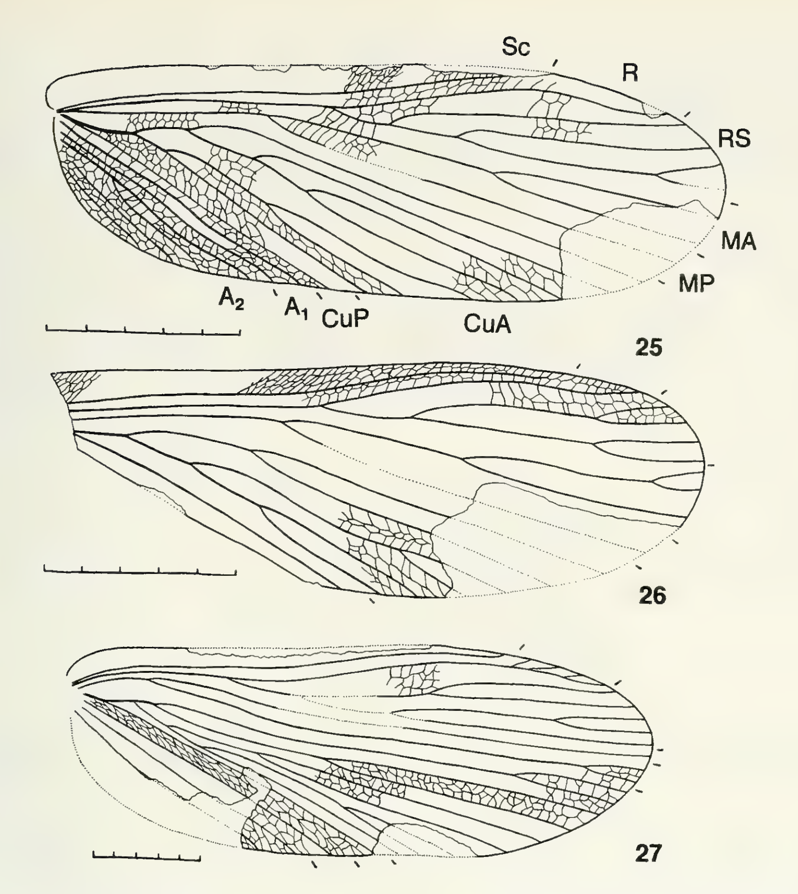
Species included. Three species from the Middle or Upper Triassic of Central Asia.



Figs 21-24. *Austroidelia asiatica*, spec. nov. 21. Fore wing, holotype, spec. No 2785/2253. 22. Pronotum and fore wings, paratype, spec. No 2240/1828. 23. Fore wing, paratype, spec. No 2069/1411. 24. Fore wing, paratype, spec. No 2555/697. Scales: 5 mm.

Key to the species of *Mesoidelia*

1. M forks near the base of wing. MP with fork. Radial area broader than costal area .... *M. semota*, spec. nov.
– M forks in basal third of wing. MP simple. Radial area equal or narrower than costal area .... 2.
2. Costal area of fore wing without veinlets. Area between R and M in basal quarter of wing with double row of cells .... *M. ignorata*, spec. nov.



Figs 25-27. Fore wings of *Mesoidelia*. 25, 26. *M. ignorata*, spec. nov. 25. Fore wing, holotype, spec. No 2555/991. 26. Fore wing, paratype, spec. No 2555/676. 27. *M. semota*, spec. nov., holotype, spec. No 2240/1837. Scales: 5 mm.

– Costal area of fore wing with traces of veinlets. Area between R and M in basal quarter of wing with three rows of cells .... *M. faceta*, spec. nov.

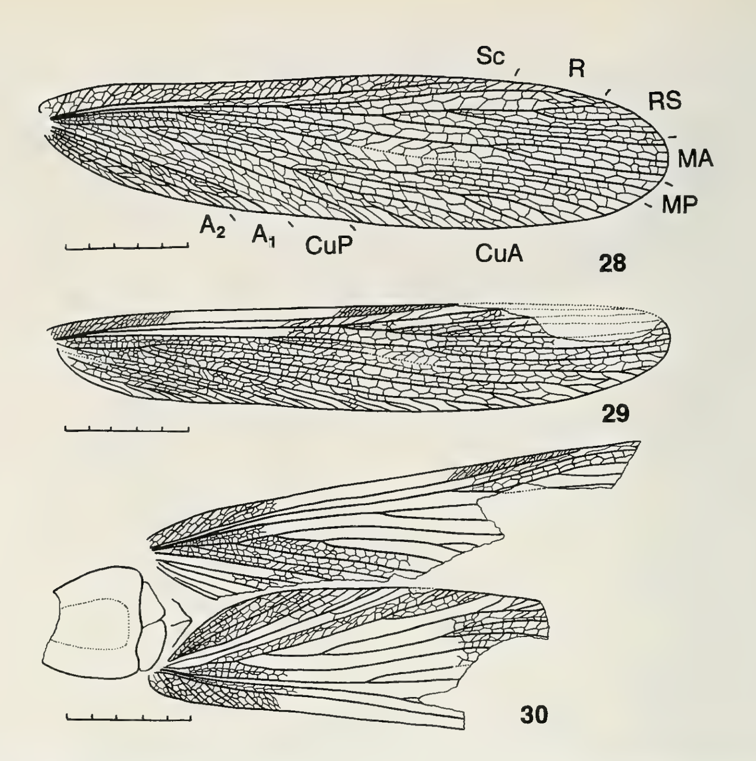
Mesoidelia ignorata, spec. nov.

Figs 25, 26

Types. Holotype: Imprint of fore wing, specimen No 2555/991; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow). – Paratype: imprint and counter-imprint of fore wing, specimens No 2555/676 from same locality.

Description

Fore wing medium-size, with broadly rounded apex. Costal area narrow; ratio of its width to maximum width of wing 7.7-8.5. Subcostal area relatively narrow, its width 1.75-2.0 times less than width of costal area. RS originating at about the middle of wing, with 4 branches directed upwards. The base of M placed near the middle between R and CuA. Maximum width of radial area equal to



Figs 28-30. *Mesoidelia faceta*, spec. nov. 29. Fore wing, holotype, spec. No 2240/1962. 29. Fore wing, paratype, spec. No 2785/2234. 30. Pronotum and fore wings, paratype, spec. No 2240/1810. Scales: 5 mm.

width of costal area. MA with 2-3 branches; MP simple. CuA with 7-8 branches. A1 simple, weakly sinuate. A2 with 5 branches. Fore wing light, without spots or stripes. Length of fore wing 17.2-18.6 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Mesoidelia semota, spec. nov.

Fig. 27

Holotype: Imprint of fore wing, specimen No 2204/1827; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow).

Description

Fore wing medium-size, with broadly rounded apex. Costal area narrow; ratio of its width to maximum width of wing 13.5. Subcostal area relatively broad, its width 1.5 times less than width of costal area. RS originating at about the first quarter of wing, with 5 branches directed upwards. The base of M related to R. Maximum width of radial area 1.6 times broader than width of costal area. MA simple; MP with short fork near the apex of wing. CuA with 9 branches. A1 simple, straight. A2 with at least 2 branches. Fore wing light, without spots or bands. Length of fore wing 27.2 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Mesoidelia faceta, spec. nov.

Figs 28-30

Types. Holotype: Imprint of fore wing, specimen No 2240/1962; Kirghizia: Madygen; Middle or Upper Triassic: Madygenian Stage (Paleontological Institute, Moscow). – Paratypes: imprints and counter-imprints of pronotum, fore wing and anterior part of hind wing, specimens No 2069/1485, 2240/1810, 2240/1960, 2240/1970, 2555/686, 2785/2107, 2785/2167, 2785/2234 from same locality.

Description

Fore wing medium-size, relatively narrow, with broadly rounded apex. Costal area narrow; ratio of its width to maximum width of wing 7.1-8.4. Subcostal area narrow, its width 2.0-2.3 times less than width of costal area. RS originating at about the middle of wing, with 3-4 branches directed upwards. The base of M related to R. Maximum width of radial area equal or 1.1-1.3 times less than width of costal area. MA with 2 branches; MP simple. CuA with 5-7 branches. A1 simple or bifurcate, almost straight. A2 with 2-3 branches. Anterior margin of hind wing similar with fore wing. Wings unicolor light. Length of fore wing 21-25 mm.

Locality and horizon. Kirghizia: Madygen; Middle or Upper Triassic, Madygenian Stage.

Acknowledgements

I would like to express my thanks to Dr. A. P. Rasnitsyn (Paleontological Institute, Moscow) for loan of the material for study.

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7. Breidbach, O. & W. Kutsch (Hrsg.): The Nervous Systems of Invertebrates: An Evolutionary and Comparative Approach. - Birkhäuser Verlag, Basel, Boston, Berlin, 1995. vii + 454 S. ISBN 3-7643-5076-8; 0-8176-5076-8.

Der vorliegende Band umfaßt die Beiträge eines Internationalen Fachsymposiums gleichen Titels im Oktober 1993 an der Universität Konstanz. Wie häufig bei solchen Multiautorbüchern schwanken Stil und Inhalt der einzelnen Beiträge beträchtlich: Überblicke wechseln mit spezifischen Themen, Vergleichendes alterniert mit Einzeldarstellung. Der Anspruch des Titels wird nur teilweise erfüllt: Die publizierten Beiträge betreffen nur acht (von etwa 25) Phyla, und oft werden nur Teilgruppen behandelt (Cnidaria, Plathelminthes, Nematoda, Hirudinea, Gastropoda & Cephalopoda, Onychophora, Echinodermata). Neun der 19 Artikel befassen sich mit Arthropoden, dem unmittelbaren Arbeitsgebiet der Herausgeber. Hier liegt auch eindeutig der Schwerpunkt und die Stärke des gesamten Bandes. Was schmerzlich vermißt wird ist eine große Zusammenschau der nervösen Baupläne, eine (oder mehrere?) große Linie(n) der Evolution des zentralen Nervensystems über die Stammesgrenzen hinweg.

Die publizierten Ergebnisse und Überblicke umfassen Elektronenmikroskopie, spezifische Neuropeptide oder neurale Homologien, wobei häufig besonderer Wert auf Letzteres gelegt wurde. Leider werden diese so sinnvollen evolutionären Ansätze häufig mit eher veralteten Stammbäumen in Verbindung gebracht. Die Aufsätze zeigen eindringlich die Notwendigkeit der engen Kooperation zwischen evolutionär argumentierenden Neurobiologen und phylogenetischen Systematikern auf. Der Band schließt mit einem sehr allgemein gehaltenen Exkurs zum Homologieproblem sowie einer vergleichend-evolutionären Betrachtungsweise der Gehirntypen von Altmeister T. H. Bullock. Nicht zuletzt der relativ hohe Preis wird eine weite Verbreitung des Bandes wohl verhindern, der aber trotzdem dem Spezialisten, insbesondere in bezug auf die vergleichende Neurobiologie der Arthropoda, gute Dienste leisten wird.

G. Haszprunar

8. Fretter, V. & A. Graham: British Prosobranch Molluscs. Their Functional Anatomy and Ecology. 2nd revised and updated Edition. - Ray Society, London TB 1780, 1994. XIX + 820 S., 343 Abb. ISBN 0-903874-23-7.

The last big work of the late Vera Fretter and Alistair Graham represents a revised and updated edition of their famous volume of 1962 with the same title. Accordingly the book is divided into two parts: Part I contains most of the original text, which is only slightly modified and updated. Some of the original chapters (e.g. on shell secretion, parasites, habitats and distribution) have been deleted. Part II contains the new chapters and largely modified chapters of the original text.

I am ambivalent about this book. Without any doubt Vera Fretter and Alistair Graham have contributed to malacology in an outstanding way throughout several decades, and their 1962 text certainly should be called "classic" being a milestone in our understanding of prosobranch gastropods. On the other hand I have to state that in my view the authors failed to present a truely revised and updated edition of the original text. In 1994 a book about functional anatomy and ecology must not ignore practically all fine-structural data on the various organ systems. For instance, although cited, there is not a single figure on sperm ultrastructure or on the various sense organs like eyes, statocysts, or osphradia. In 1994 one must not speak about functional anatomy of the nervous system without mentioning nearly all data revealed by neuronal tracing methods. The same is true concerning the ecological parts, where many recent developments and results are simply not mentioned in the text. Moreover, results on developmental mechanisms are likewise ignored. Admittedly being quite sensitive on the subject, I found the chapter on prosobranch relationships and classification in particular embarrassing. There are not even traces of truely phylogenetic (cladistic) argumentation, and there is not a single tree or any classification. In addition, I think that phylogenetically important groups such as the taxa from the habitat of hydrothermal vents, architectonicids or similar cases must be noted in such a review, also if there are no British representatives.

To conclude: Despite all critical remarks buy this book, if you do not already have the original text. You still will profit a lot from excellent anatomical drawings (except Fig. 341 on the nervous system of *Acmaea* and *Lepeta*, which includes several errors; pers. obs.) and from the rich knowledge of two outstanding experts. However, I cannot recommend this volume as a revised and updated edition of the original text.

G. Haszprunar

9. Krumbiegel, G. & B. Krumbiegel: Bernstein: Fossile Harze aus aller Welt. Vorkommen, Gewinnung, Inklusen. - Fossilien, 7. Goldschneck-Verlag, Weinstadt, 1994. 112 S., 62 Farb-, 30 Schwarzweißabb., 13 Zeichn. ISBN 3-926129-16-6.

Diese Broschüre vermittelt in anschaulicher Weise das heutige Wissen über Bernstein. Nach einem geschichtlichen Abriß, der den vielfältigen Gebrauch und die große wirtschaftliche Bedeutung des fossilen Harzes darlegt, werden die verschiedenen Bernsteinarten und deren Eigenarten erklärt. Der Leser kann sich ausführlich über die wichtigsten Lagerstätten der Welt und ihre Verbreitung informieren sowie über die Verarbeitung des Materials. Die Abhandlung über Bernstein-Einschlüsse ist mit sehr interessanten und schönen Bildern versehen und zeigt die Bedeutung, die diese Inklusen für die biologische Entwicklung hin zur heutigen Flora und Fauna haben. Abgeschlossen wird die Arbeit, die schnell in die Materie des Bernsteins einführt, mit einer weiterführenden Bibliographie und einer Adressenangabe der Museen, die eine wichtige Bernsteinsammlung haben.

E. Diller

SPIXIANA	19	1	129–135	München, 01. März 1996	ISSN 0341–8391

Beschreibung einer neuen Burside von den Philippinen sowie Bemerkungen zur Systematik in der Familie Bursidae

(Mollusca, Gastropoda, Bursidae)

Von **Manfred Parth**

Parth, M. (1996): Description of a new species of Bursidae from the Philippines and notes to the systematics in Bursidae (Mollusca, Gastropoda, Bursidae). – Spixiana **19/1:** 129-135

Bufonaria borisbeckeri, spec. nov. from the Philippines is described and compared with *B. gnorima* (Melvill, 1918).

Manfred Parth, Erzgießereistraße 18c, D-80335 München, Germany.

Eine neue Art der Gattung *Bufonaria* wird anhand von vier Exemplaren beschrieben. Die neue Art ist sehr nahe mit *Bufonaria (Bufonaria) gnorima* (Melvill, 1918) verwandt und ist bislang nur von den Philippinen bekannt, wo sie in tieferen Gewässern von Cebu vorkommt.

Bufonaria (Bufonaria) borisbeckeri, spec. nov.
Abb. 1-4

Typen. Holotypus: Aus tieferen Gewässern (ca. 150-200 m) von Cebu (Zoologische Staatssammlung, München, Eing. Kat. Nr. 1996 0001). - Paratypen: 3 Ex., ebenfalls Cebu (in Coll. Parth).

Maße. Holotypus: Höhe 36.4 mm, Breite 24.3 mm. - Paratypus 1: Höhe 39.0 mm, Breite 26.2 mm; Paratypus 2: Höhe 38.3 mm, Breite 25.2 mm; Paratypus 3: Höhe 47.1 mm, Breite 30.9 mm; Paratypus 4: Höhe 32.4 mm, Breite 23.1 mm.

Kleines, dickschaliges Gehäuse mit gattungstypischem Varixrhythmus von 180°. Gehäuseoberfläche glatt mit sehr feinen Knötchen auf den drei Spiralreifen erster Ordnung. Auf der Schulter drei bis fünf kleine Höcker bildend. Weitere Spiralskulptur sehr feinkörnig. Beim Holotypus bilden die Spiralreifen im Varixbereich auf den letzten beiden Umgängen eine kantige Skulptur, während die Varices bei allen Paratypen rund verlaufen. Gehäusefärbung sehr unterschiedlich, von hell- bis dunkelbraun. Mündung mit auffällig langem Analkanal, der bis über die Varix des vorhergehenden Umgangs hinausragt. Innenlippenkollar schwach mit feinen Zähnen über die ganze Länge. Außenlippe mit bis zu zwölf Zahnleisten. Außenlippe des Holotypus sehr breit und dünnschalig, ein Teil der Lippe abgebrochen. Protochonch mit ca. 3.5 Umgängen, Durchmesser etwas geringer als der von *B. gnorima.*

Differentialdiagnose

Von der am nächsten stehenden Art, *Bufonaria (Bufonaria) gnorima* (Melvill, 1918) (Abb. 4-5), unterscheidet sich *B. borisbeckeri* in folgenden Merkmalen:

Kleinere Durchschnittshöhe (nicht über 50 mm), während *Bufonaria gnorima* bis 90 mm erreichen kann.

Etwas kleinerer Durchmesser des Protoconchs (3.4 mm), gegenüber 3.9 mm bei *B. gnorima.*

Abb. 1. *Bufonaria borisbeckeri*, spec. nov. Holotypus. Links: Ventralansicht. Mitte: Lateralansicht. Rechts: Dorsalansicht.

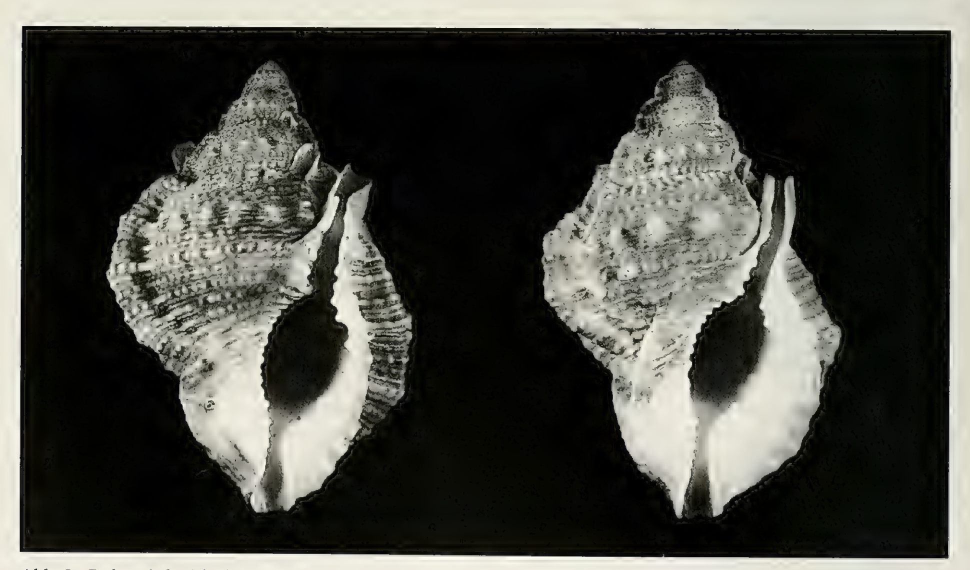


Abb. 2. *Bufonaria borisbeckeri*, spec. nov. Ventralansicht. Links: Paratypus 2. Rechts: Paratypus 1.

Varices verhältnismäßig viel breiter und tiefer als jene von *B. gnorima*.

Analkanal länger; reicht über die Varix des vorhergehenden Umgangs hinaus, wogegen bei *Bufonaria gnorima* der Analkanal nur (wenn überhaupt) bis an den Rand der vorhergehenden Varix reicht.

Gehäuse dorsoventral flacher als jenes von *Bufonaria gnorima*. Gehäusefärbung bei *B. borisbeckeri* meist viel dunkler. Gehäuseoberfläche viel feinkörniger.

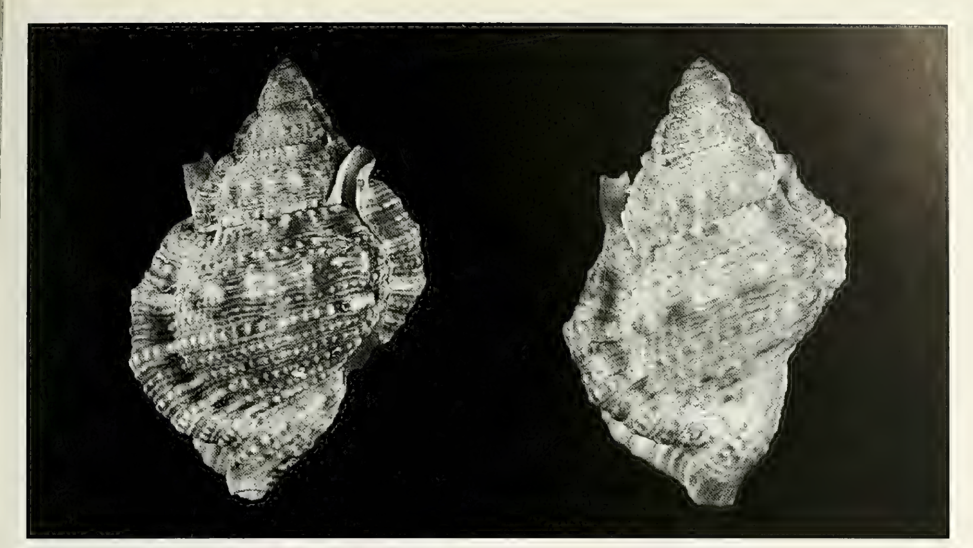


Abb. 3. *Bufonaria borisbeckeri*, spec. nov. Dorsalansicht. Links: Paratypus 2. Rechts: Paratypus 1.

Abb. 4. Ventralansichten. Links: *Bufonaria borisbeckeri*, spec. nov. Rechts: *Bufonaria gnorima* (Melvill, 1918) (Länge 44,7 mm). Beide juvenil.

Derivatio nominis

Ich widme die neue Art Boris Becker, dem meines Erachtens größten deutschen Einzelsportler aller Zeiten.



Abb. 5. *Bufonaria gnorima* (Melvill, 1918). 3 Ex. von Bohol, Philippinen. Ventralansichten. Längen: 64.5 mm, 63.4 mm, 50.5 mm.

Zur Systematik in der Familie Bursidae

T. Cossignani veröffentlichte 1994 das Buch "Bursidae of the World", welches in der Qualität der Abbildungen sowie in der Form der Kurzdiagnosen hervorragend ist. Cossignani folgte im wesentlichen der Systematik von Alan Beu (NZGS), wobei er in einigen Fällen eine abweichende Meinung vertrat.

Seit Veröffentlichung der Arbeit von Beu (1987) wurden viele neue Funde bekannt; auch trugen Veröffentlichungen des Autors dazu bei, daß die Systematik in dieser Familie immer transparenter wurde. Eine meiner Arbeiten (Parth 1991) wurde leider von Cossignani (aus Zeitgründen ?) nicht berücksichtigt und auch nicht im Literaturverzeichnis aufgeführt.

In der Zwischenzeit konnte ich einige systematische Problemfälle lösen, die im folgenden diskutiert werden. Es sind großenteils Fälle, in denen ich mit Cossignani nicht konform gehe. Als Anhang folgt eine Auffstellung aller meiner Ansicht nach gültigen Arten:

1. Die Arten *Bufonaria albivaricosa* (Reeve, 1844) und *Bufonaria subgranosa* (G. B. Sowerby II, 1836) sind meines Erachtens eindeutig Synonyme der Art *B. rana* (Linné, 1758). Der Protoconch ist bei allen drei Formen völlig identisch; die Variationen und Ähnlichkeiten der drei Formen im gesamten Indo-Westpazifik lassen keine Einteilung in drei distinkte Arten zu.

2. Cossignani erwähnt das sympatrische Vorkommen der beiden Unterarten *Bufonaria crumena crumena* (Lamarck 1816) und *Bufonaria crumena cavitensis* (Beck in Reeve, 1844) auf den Philippinen. Dies ist grundsätzlich unmöglich und eine Aufteilung der Art *B. crumena* in zwei Unterarten auch aufgrund der geringen morphologischen Unterschiede völlig überflüssig.

3. Die Art *Bufonaria echinata* (Link, 1807) wird von Cossignani u.a. mit dem Fundort Philippinen vorgestellt. Sie wurde jedoch noch nie auf den Philippinen gefunden.

4. Auch für *Bursa asperrima* (Dunker, 1862) gibt Cossignani als alleinigen Fundort "Philippines" an; auch diese Art kommt dort nicht vor.

5. *Bursa leo* Shikama, 1964. In Übereinstimmung mit Beu betrachte ich *B. leo* als Synonym der Art *B. tuberosissima* (Reeve, 1844).

6. *Bursa luteostoma* (Pease, 1861) ist meiner Meinung nach lediglich eine Form mit hohem Gewinde von *Bursa bufonia* (Gmelin 1791).

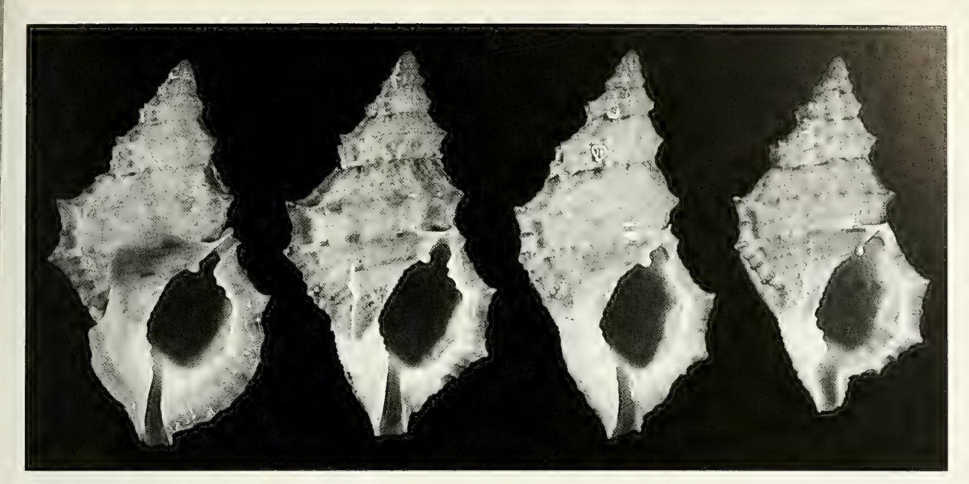


Abb. 6. *Bufonaria fijiensis* (Watson, 1881). 4 Ex. von Bohol, Philippinen. Ventralansichten. Längen: 67.4 mm, 67.5 mm, 68.0 mm, 63.2 mm. Das Exemplar ganz rechts mit nahezu identischer Mündung wie der Holotypus.

7. Der Aufteilung von *Bursa rhodostoma* (Beck in G. B. Sowerby II, 1835) in zwei geographische Unterarten kann ich nicht folgen und halte die morphologischen Unterschiede für zu gering.

8. Ebenso kann ich der Aufteilung der Art *Bursa corrugata* (Perry, 1811) in drei geographische Unterarten nicht folgen. Auch hier sind die morphologischen Unterschiede zu gering.

9. Auch bei *Bursa granularis* (Röding, 1798) halte ich die Aufteilung in zwei geographische Unterarten nicht für notwendig. Bei dem von Cossignani abgebildeten Exemplar des möglichen Holotypus von *Ranella semigranosa* Link (MHNG 1098/86) handelt es sich nicht um *Bursa granularis* (wie von Cossignani angegeben), sondern um die Art *B. corrugata* (Perry, 1811).

10. *Bursa humilis* Beu, 1981. Beu hat sie als geographische Unterart von *B. ranelloides* beschrieben. Meines Erachtens hat sie aufgrund der großen Variabilität von *Bursa ranelloides* keine Berechtigung. Die Erhebung von *B. humilis* zu einer validen Art durch Cossignani ist daher nicht akzeptabel.

11. Cossignani spaltete *Bursa latitudo* Garrard, 1961 in vier Unterarten. Dieser Wissensstand ist seit meiner Arbeit (Parth 1991) überholt.

12. *Crossata californica* (Hinds, 1844) sowie *Crossata sonorana* (Berry, 1960) betrachte ich in Übereinstimmung mit Cossignani als Synonyme der Art *Crossata ventricosa* (Broderip, 1833).

13. Ich hatte vor Jahren die Möglichkeit, den Holotypus von *Bursa fijiensis* (Watson, 1881) eingehend zu studieren. Damals kam ich noch zu keinem konkreten Ergebnis; aber klar war mir schon zu jener Zeit, daß es sich dabei um ein noch nicht ausgewachsenes Exemplar handelte und es nur eine Frage der Zeit sei, daß weitere Exemplare dieser Tiefwasserform gefunden würden. Dies ist nun dank der Funde in Neukaledonien und auf den Philippinen geschehen. Bei diesen Exemplaren handelt es sich um eine Extremform von *Bursa awatii* Ray, 1949 (diese Art ist wohl die variabelste Art der ganzen Familie). Das Geheimnis um *Ranella fijiensis* wurde nun endgültig gelöst, da *Bursa awatii* jetzt definitiv als Synonym von *Ranella fijiensis* Watson, 1881 einzustufen ist. Der Auffassung von Cossignani und Beu, daß es sich bei *Bursa awatii* und *Bursa fijiensis* um zwei distinkte Arten handelt, kann ich nicht folgen. *Bursa fijiensis* (Watson, 1881) kommt von Somalia bis zu den Fiji-Inseln in einer unglaublichen Variabilität vor. Sie erreicht eine Größe von über 10 cm (Exemplare in Sammlung E. Romagna Manoja und Manfred Parth).

14. Cossignani bildet nicht den Holotypus von *B. lucaensis* Parth, 1991 ab, sondern ein sich in der Sammlung von Mrs. Dawn Brink befindliches Exemplar dieser Art. Auch die Angaben zum Holotypus stimmen nicht, denn der Holotypus ist im American Museum of Natural History, Cat. A, No. 232182, verwahrt.

Liste der validen Arten der Familie Bursidae

Bufonaria (Aspa) marginata (Gmelin, 1791)

Bufonaria (Bufonaria) borisbeckeri, spec. nov.
Bufonaria (Bufonaria) cristinae Parth, 1989
Bufonaria (Bufonaria) crumena (Lamarck, 1816)
Bufonaria (Bufonaria) echinata (Link, 1807)
Bufonaria (Bufonaria) elegans (Beck in Sowerby II, 1836)
Bufonaria (Bufonaria) fernandesi Beu, 1977
Bufonaria (Bufonaria) foliata (Broderip, 1826)
Bufonaria (Bufonaria) gnorima (Melvill, 1918)
Bufonaria (Bufonaria) ignobilis Beu, 1987
Bufonaria (Bufonaria) margaritula (Deshayes, 1832)
Bufonaria (Bufonaria) nobilis (Reeve, 1844)
Bufonaria (Bufonaria) perelegans Beu, 1987
Bufonaria (Bufonaria) rana (Linné, 1758)
(= *subgranosa* G. B. Sowerby II, 1836)
(= *albivaricosa* Reeve, 1844)
Bufonaria (Bufonaria) thersites (Redfield, 1846)

Bufonaria (Marsupina) bufo (Bruguière, 1792)
Bufonaria (Marsupina) nana (Broderip & Sowerby, 1829)

Bursa (Bursa) angioyorum Parth, 1990
Bursa (Bursa) asperrima (Dunker, 1862)
Bursa (Bursa) bufonia (Gmelin, 1791)
(= *luteostoma* Pease, 1861)
Bursa (Bursa) cruentata (G. B. Sowerby II, 1835)
Bursa (Bursa) davidboschi Beu, 1987
Bursa (Bursa) grayana (Dunker, 1862)
Bursa (Bursa) lamarckii (Deshayes, 1853)
Bursa (Bursa) lucaensis Parth, 1991
Bursa (Bursa) muehlhaeusseri Parth, 1990
Bursa (Bursa) rhodostoma (Beck in G. B. Sowerby II, 1835)
Bursa (Bursa) rosa (Perry, 1811)
Bursa (Bursa) rugosa (G. B. Sowerby II, 1835)
Bursa (Bursa) tuberosissima (Reeve, 1844)
(= *leo* Shikama, 1964)
Bursa (Bursa) venustula (Reeve, 1844)

Bursa (Colubrellina) condita (Gmelin, 1791)
Bursa (Colubrellina) corrugata (Perry, 1811)
Bursa (Colubrellina) fijiensis (Watson, 1881)
(= *awatii* Ray, 1949)
(= *rehderi* Beu, 1978)
Bursa (Colubrellina) granularis (Röding, 1798)
Bursa (Colubrellina) fosteri Beu, 1987
Bursa (Colubrellina) latitudo Garrard, 1961
(= *wolfei* Beu, 1981)
Bursa (Colubrellina) natalensis Coelho & Matthews, 1970
Bursa (Colubrellina) quirihorai Beu, 1987
Bursa (Colubrellina) ranelloides (Reeve, 1844)
(= *humilis* Beu, 1981)

Bursa (Colubrellina) scrobilator (Linné, 1758)
Bursa (Colubrellina) verrucosa (G. B. Sowerby I, 1825)

Crossata ventricosa (Broderip, 1833)
(= *californica* Hinds, 1844)
(= *sonorana* Berry, 1860)

Tutufa bardeyi (Jousseaume, 1894)
Tutufa boholica Beu, 1987
Tutufa bubo (Linné, 1758)
Tutufa bufo (Röding, 1798)
Tutufa nigrita Mühlhäusser & Blöcher, 1979
Tutufa oyamai Habe, 1973
Tutufa rubeta (Linne, 1758)
Tutufa tenuigranosa (E. A. Smith, 1914)

Die Familie Bursidae beinhaltet somit 51 valide Arten.

Literatur

Beu, A. G. 1987. Taxonomy of gastropods of the families Ranellidae (= Cymatiidae) and Bursidae. Part II. Descriptions of fourteen new Indo-West Pacific species and subspecies, with revisions of related taxa. - New Zealand J. Zool. **13**: 273-355

Cossignani, T. 1994. Bursidae of the World. - Ed. L'Informatore Piceno, Ancona. 1-119

Parth, M. 1991. Einige Bemerkungen zur *Bursa latitudo-* und *Bursa ranelloides*-Gruppe und zum Protoconch von *Bursa condita* (Gmelin, 1791). - Spixiana **14** (2): 209-212

10. Rosen, D. (Hrsg.): Advances in the Study of *Aphytis* (Hymenoptera: Aphelinidae). - Intercept Ltd, Andover, 1994. 362 S. ISBN 0-946707-47-2.

Dieses Buch faßt alle Erkenntnisse zusammen, die auf dem Symposium "Advances in the Study of *Aphytis*" im Juni 1992 im Rahmen des 19. Internationalen Entomologenkongresses in Peking, China, vorgetragen wurden. Zusätzlich sind in diesem Sammelwerk noch Arbeiten zur Thematik publiziert, die nicht auf dem Kongreß vorgestellt wurden. Somit enthält es fast das gesamte Spektrum der *Aphytis*-Forschung. Der Abschnitt über die Nutzbarmachung dieser für die biologische Schädlingsbekämpfung bedeutenden parasitischen Wespen ist seiner wirtschaftlichen Bedeutung entsprechend herausgehoben. Biologie, Ökologie, Faunistik, kurz auch Systematik und Phylogenie der weltweit verbreiteten Parasiten sind in vielen, reich illustrierten Beiträgen dargestellt. E. Diller

11. Di Trocchio, F.: Der große Schwindel. Betrug und Fälschung in der Wissenschaft. - Campus Verlag, 1994. 221 S.

Betrug in der Wissenschaft? Und das seit Ptolemäus zu Beginn unserer Zeitrechnung? Bis heute in steigender Intensität? Starker Tobak, den uns der Autor, ein ausgewiesener Fachmann für Wissenschaftsgeschichte, da auftischt. Er hat es dennoch geschafft, dieses prinzipiell ernste Thema so amüsant und witzig zu diskutieren, daß der Thematik viel von ihrer Schärfe genommen wird. Ob Nobelpreisträger oder kleines Rädchen im Wissenschaftgetriebe, gefälscht und gelogen wurde oft, die Motive waren und sind jedoch höchst unterschiedlich. Wurde früher zum Beweis großer wissenschaftlicher Theorien ein Experiment gefälscht, wie dies zum Beispiel Newton praktizierte, so geschieht dies heutzutage meist nur noch im Kampf um die Forschungsgelder. Bemerkenswert ist, daß als Belege für rezente Betrügereien nahezu ausschließlich Beispiele aus den Naturwissenschaften angeführt werden. Sowohl der Anreiz zum Betrug (Höhe der Forschungsgelder) als auch die Gefahr der Entdeckung (experimentelle Überprüfung) scheint hier ungleich höher zu sein, als in anderen Disziplinen.

Wenn der Autor die heutige Wissenschaftlergeneration ganz treffend "Forschungssöldner" nennt, so zeigt dies, daß Erkenntnisgewinn - geboren aus der Neugier des Menschen - von der Berufung zum Beruf verkommen ist. Wie dem auch sei, der Autor vermag durch detaillierte Recherchen den aufgegriffenen Fällen die Spannung von Kriminalromanen zu verleihen. Die Schilderung der Hintergründe zur Piltdown-Fälschung nimmt geradezu epische Ausmaße an. Es ist das Verdienst des Autors, sich als scharfzüngiger Kritiker des modernen Wissenschaftsbetriebes an dieses schwierige Thema herangewagt und der "scientific community" auf amüsante Weise den Spiegel vorgehalten zu haben. Ein Buch, das man mit Begeisterung liest. M. Carl

12. Otto, C. (ed.): Proceedings of the 7th International Symposium on Trichoptera. Umea, Sweden, 3.-8. August 1992. - Backhuis Publishers, Leiden, 1993. 312 S.

Mit 82 Teilnehmern aus 21 Ländern aller fünf Kontinente bewies das seit 1974 alle drei Jahre stattfindende Treffen der an allen Aspekten der Biologie der Köcherfliegen Interessierten auch 1992 in Umea, Schweden eine ungebrochenen Attraktivität. In dem thematisch breitgefächerten Angebot der 5O wissenschaftlichen Vorträge und 34 Poster werden fundierte Forschugsergebnisse aus sieben Themenbereichen dargelegt, wobei die Ökologie einen besonderen Raum einnimmt mit Ökologie-Habitatanpassung, Ökologie - Verhalten und Ökologie - angewandte Aspekte. Weitere Themengruppen decken die klassischen Bereiche der Morphologie, Zoogeographie, Taxonomie und Systematik sowie die Entwicklungsgeschichte ab. Man darf auf die Ergebnisse des nächsten Symposiums, das bereits 1995 in Minneapolis-St. Paul, USA, stattgefunden hat, gespannt sein. H. Burmeister

13. Bahadir, M., Parlar, H. & M. Spiteller (Hrsg.): Springer Umweltlexikon. - Springer-Verlag, Berlin, Heidelberg, New York, 1995. 1176 S. ISBN 3-540-54003-2.

Dieses Nachschlagewerk stellt den Versuch dar, möglichst viele biotische, abiotische und technische sowie natürliche und zivilisatorische Einzelfakten in dem Gesamtgefüge der Umweltbeziehungen zu dokumentieren. Dabei stehen chemische Basisdaten deutlich im Vordergrund, wobei neben den Stoffanalysen der Umwelt auch die der anthropogenen Produktion Erwähnung finden. 64 Autoren haben etwa 100 Fachgebiete und Disziplinen bearbeitet und hier ein Werk mit ca. 9000 Stichwörtern von AAS - Atomabsorbtionsspektrometrie bis Zytostatika zusammengestellt. Neben den Strukturformeln meist organischer chemischer Verbindungen, Berechnungsparametern, technischen Betriebsanlagen, Radioaktivitätswerten, Abgaswirkungen, Gliederung der Ozeane, Klimabedingungen, Bodenhygiene werden auch einige wenige umweltbezogener Tiergruppen erwähnt, die als potentielle Bioindikatoren in Betracht kommen. Insgesamt handelt es sich um ein sehr nützliches Nachschlagewerk, das auch die neueste nicht immer gängige Terminologie einschließt. Der Interessentenkreis ist sicher auf das raumsprengende Gebiet der Umweltwissenschaften und der Technik ausgedehnt. E.-G. Burmeister

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INHALT - CONTENTS



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Three new species of the genus *Dicraspeda* Chaudoir from New Guinea

(Insecta, Coleoptera, Carabidae, Odacanthinae)

By **Martin Baehr**

Baehr, M. (1996): Three new species of the genus *Dicraspeda* Chaudoir from New Guinea (Insecta, Coleoptera, Carabidae, Odacanthinae). – Spixiana **19/2:** 137-146

Dicraspeda obsoleta, spec. nov. from central Irian Jaya, and *D. loebli*, spec. nov. and *D. ullrichi*, spec. nov., both from eastern and central Papua New Guinea are newly described. For comparison the male genitalia of the related species *D. brunnea* Chaudoir and *D. bispinosa* Darlington, respectively, are figured. A complete new key to the *Dicraspeda* species of New Guinea is given.

Dr. Martin Baehr, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München, Germany.

Introduction

Within a sample of Carabid beetles, collected by A. Riedel on different occasions and in different parts of Irian Jaya (New Guinea), a new species of the Oriental-Australian genus *Dicraspeda* Chaudoir was found that is closely related to the widespread *D. brunnea* Chaudoir. When I identified the very rich sample of carabids from the Muséum d'Histoire naturelle, Genève, that was collected by W. G. Ullrich in Papua New Guinea in 1979/80, I found two further new species closely related to *Dicraspeda bispinosa* Darlington.

Due to the structural diversity of the genus *Dicraspeda* (in the sense of Darlington 1968) it may be disputable whether the genus is really a taxonomic unit. Perhaps it should be divided again in different genera, as it was done before Darlington united with *Dicraspeda* the old genera *Philemonia* Liebke for the bispinose species with deeply excised fourth tarsomeres, and *Macrocentra* Chaudoir for the quadrispinose species.

Measurements

Measurements have been made with a stereo microscope by use of an ocular micrometer. Length has been measured from apex of labrum to tip of elytra, in spinose specimens to the apex of the elytral spines. Hence, measurements may slightly differ from those of other authors, especially Darlington (1968).

Abbreviation of Collections mentioned in text

CBM	Collection M. Baehr, München
MCZ	Museum for Comparative Zoology, Cambridge/Mass.
MHNG	Muséum d'Histoire naturelle, Genève
NHMW	Naturhistorisches Museum, Wien

SMNS Staatliches Museum für Naturkunde, Stuttgart
ZSM Zoologische Staatssammlung, München
ZSM-CBM Zoologische Staatssammlung, München, as permanent loan in the working collection of author

Genus *Dicraspeda* Chaudoir

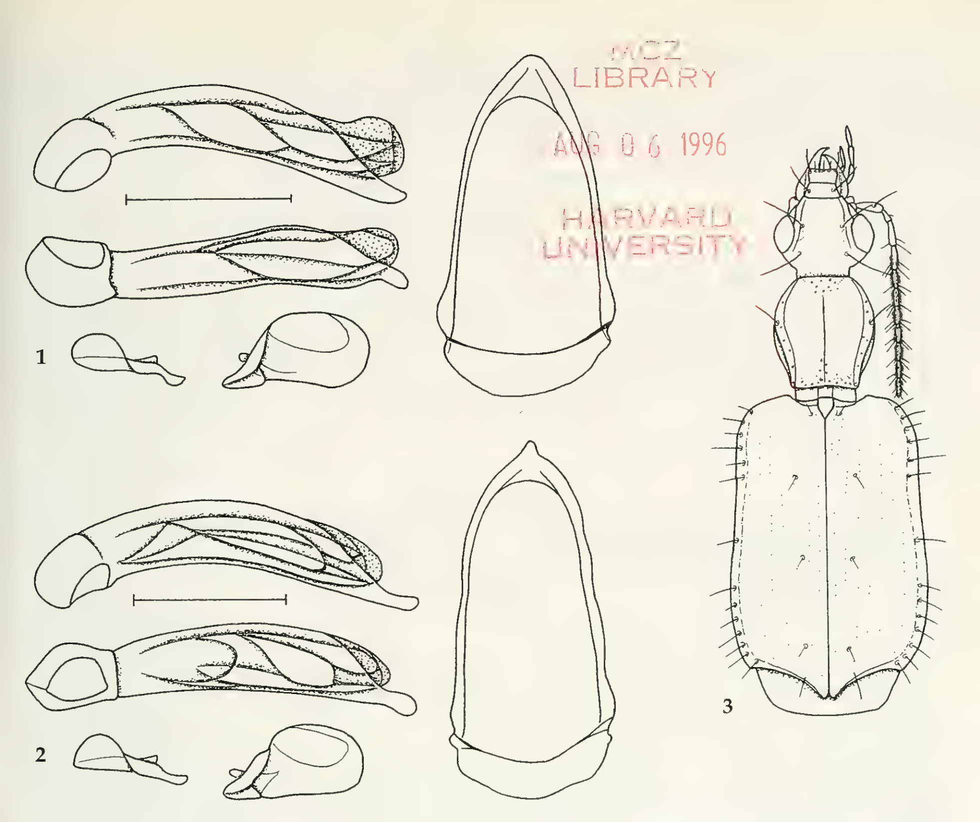
Dicraspeda Chaudoir, 1862, p. 300; Csiki 1932, p. 1536; Liebke 1938, p. 88; Darlington 1968, p. 210; Moore et al. 1987, p. 274.
Macrocentra Chaudoir, 1869, p. 205; Darlington 1968, p. 210.
Philemonia Liebke, 1938, p. 83; Darlington 1968, p. 210.

Type species: *Dicraspeda brunnea* Chaudoir, 1862, by monotypy.

Key to the New Guinean species of *Dicraspeda* Chaudoir

In parts, this key follows that of Darlington (1968, p. 211).

1. Apex of elytra not spinose or denticulate .... 2.
– Apex of elytra spinose or denticulate .... 4.
2. 4th tarsomere of metatarsus emarginate for c. ⅓ of length only .... 3.
– 4th tarsomere of metatarsus emarginate for more than ⅔ of length .... *longiloba* (Liebke)
3. Surface of elytra microreticulate, striae distinctly impressed, apex barely excised; aedeagus sinuate, apex not widened (Fig. 1) .... *brunnea* Chaudoir
– Surface of elytra not microreticulate, striae not impressed, apex distinctly excised; aedeagus not sinuate, apex widened (Fig. 2) .... *obsoleta*, spec. nov.
4. Apex of elytra spinose or denticulate at sutural angle only .... 5.
– Apex of elytra bispinose at sutural and lateral angles .... 8.
5. Body size smaller, <8.0 mm; 4th tarsomere of metatarsus emarginate for <½ of length only; sutural angle of elytra only denticulate .... *dubia* (Gestro)
– Body size larger, >8.0 mm; 4th tarsomere of metatarsus emarginate for c. ⅔ of length; sutural angle of elytra denticulate or spinose .... 6.
6. Sutural angle of elytra only denticulate (Fig. 13); eyes not protruding, lateral margin of head including eye evenly convex (Fig. 10); aedeagus compact, large near apex, apex turned up, angle between lower surface of aedeagus and apex inconspicuous (Fig. 6) .... *ullrichi*, spec. nov.
– Sutural angle of elytra spinose (Figs 11-12); eyes protruding, lateral margin of head including eyes not evenly convex (Figs 8, 9); aedeagus narrower near apex, apex not distinctly turned up, angle between lower surface of aedeagus and apex conspicuous or not (Figs 4, 5) .... 7.
7. Elytra slightly longer, ratio length/width >1.71, spines at apex longer (Fig. 11); microreticulation of elytra in females complete, in males distinct at least in apical half, intervals barely convex; aedeagus wider at apex, lower surface markedly bisinuate, angle between lower surface and apex conspicuous, outer surface rough (Fig. 4) .... *bispinosa* Darlington.
– Elytra slightly shorter, ratio length/width c. 1.66, spines at apex shorter (Fig. 12); microreticulation of elytra in females visible only in apical half, in males almost absent, intervals distinctly convex; aedeagus narrower at apex, lower surface evenly concave, angle between lower surface and apex barely indicated, outer surface smooth (Fig. 5) .... *loebli*, spec. nov.
8. Colour black; tarsi sulcate-carinate above .... *quadrispinosa* (Chaudoir)
– Colour green-purple; tarsi not sulcate-carinate above .... *violacea* (Sloane)



Figs 1, 2. Genital ring, parameres, left side and lower surface of aedeagus. 1. *Dicraspeda brunnea* Chaudoir. 2. *D. obsoleta*, spec. nov. Scales: 0.5 mm.
Fig. 3. *Dicraspeda obsoleta*, spec. nov. Habitus. Length: 5.7 mm.

Discraspeda brunnea Chaudoir
Fig. 1

Dicraspeda brunnea Chaudoir, 1862, p. 300; Csiki 1932, p. 1536; Liebke 1938, p. 89; Jedlicka 1963; p. 503 (as *Discrapeda*!); Darlington 1968, p. 211.

Diagnosis. Rather wide, depressed species with depressed, coarsely punctate pronotum and regularly striate elytra with coarsely punctate striae. Further distinguished from *D. obsoleta*, spec. nov. by head wider with markedly protruding eyes, pronotum narrower, elytra posteriorly distinctly widened with impressed and deeply punctate striae, presence of microreticulation on elytra, oblique shoulders with angulate shoulder angle, barely excised apex of elytra, and sinuate aedeagus with not widened apex.

For comparison with the new species described below the ratios of five measured specimens of *D. brunnea* are dealt with and the male genitalia are for the first time described and figured.

Measurements. Length: 6.0-6.5 mm. Ratios. Width/length of pronotum: 0.87-0.88; width of head/width of pronotum: 1.09-1.10; length/width of elytra: 1.50-1.51.

♂ genitalia (Fig. 1). Genital ring elongate, slightly narowed to the obtusely rounded apex, with regular lateral margin of arms. Aedagus elongate, laterally sinuate, ventral surface slightly concave, apex not widened, slightly turned to the right.

Material examined: 1♂, S.-Sulawesi, Ujung Padang, Bantimurung, 29.8.1990, leg. A. Riedel (CBM); 2♀♀, Philippines: Leyte, Visca N Baybay, 100-200 m, leg. Schawaller et al., 21.II.1991 (SMNS); 1♀, Malaysia, Sarawak, Mulu NP, 3.-6.3.1993, leg. H. Zettel (NHMW); 2♂♂, Indonesia, Lombok Is., Senaro, N-slope of Rinjani, 1100 m, 2.-5. Feb 1994, Bolm lgt. (CBM, SMNS).

Distribution: According to Darlington (1968) this species is widely distributed in the southeastern Oriental region and in the Australian region and was known to him from northern Australia, New Guinea, New Britain, Timor, Celebes, some Philippine islands, and Java. The records from Borneo (Sarawak) and Lombok are new though not unexpected and further enlarge the known range.

Dicraspeda obsoleta, spec. nov.

Figs 2, 3

Types. Holotype: ♂, Irian Jaya, Biak Is. Umg. Sepse, 3.10.1990, leg. A. Riedel (ZSM-CBM).

Diagnosis. Rather wide, depressed species with depressed pronotum, distinguished from the most closely related species *D. brunnea* Chaudoir by smaller head with less protruding eyes, wider, almost impunctate pronotum, rather parallel elytra with striae not impressed but indicated by very fine punctures in anterior half only, absence of microreticulation on elytra, shoulders not oblique but evenly rounded with convex shoulder angle, distinctly excised apex of elytra, and not sinuate aedeagus with widened, slightly club-shaped apex.

Description

Measurements. Length: 5.7 mm. Ratios. Width/length of pronotum: 0.94; width of head/width of pronotum: 1.03; length/width of elytra: 1.50.

Colour. Upper and lower surfaces black. Mouth parts and antenna light piceous, three basal antennomeres reddish-piceous. Legs yellowish, tibiae and tarsi feebly darker.

Head (Fig. 3). Moderately large, depressed. Eyes large, laterally moderately projecting, orbits slightly >0.5× as long as eyes, slightly convex, forming an angle of c. 135° with the neck. Clypeus separated by a fine suture, labrum large, anteriorly straight, 6-setose. Mandibles and palpi of average size. Medially of eye with a strong ridge, medially of this with an irregularly sinuate furrow from apex of frons to about posterior third of eye. Frons rather depressed, surface slightly irregular. Neck separated from vertex by a transverse furrow. Posterior supraorbital seta situated well behind posterior margin of eye. Antenna moderately elongate, barely surpassing base of pronotum, median antennomeres slightly >2.5× as long as wide. Surface of head apart from labrum without micrireticulation, impunctate and impilose, highly glossy.

Prothorax (Fig. 3). Slightly longer than wide, surface faintly convex. Widest part slightly in front of middle, margin anteriorly evenly rounded, posteriorly fain tly concave. Lateral border distinct, angulate throughout. Behind middle proepipleuron and proepisternum narrowly visible from above. Apex almost straight, anterior angles rounded off, barely indicated. Base faintly excised, posterior angles right, though at apex obtuse. Inner margin with a wide channel that diminishes towards apex and narrows towards base. Inner border of the channel marked by a strong ridge. Surface with a distinctly impressed median line, a rather shallow, v-shaped anterior sulcus, and a barely impressed transverse basal sulcus. Anterior marginal seta situated at widest part, posterior marginal pore within the posterior angle, both posterior setae broken. Microreticulation absent. Surface impunctate, only anterior and posterior sulcus and lateral channel with scattered coarse punctures, and with some weak transverse strioles, glossy.

Elytra (Fig. 3). Rather short and wide, posteriorly barely widened, though lateral margin in anterior third faintly compressed. Surface slightly convex, in middle depressed, in anterior third with a very shallow, oblique impression on either side. Shoulders wide, evenly rounded, shoulder angle almost rounded off. Marginal channel rather wide throughout, distinctly crenulate. Apex oblique, perceptibly concave. Outer apical angle projecting but obtuse, inner angle rounded, apex with coarse border line. Striae marked by rows of very fine punctures, virtually not impressed, punctures becoming even finer towards apex, intervals absolutely depressed. Third interval with three setiferous punctures, the first adjacent to 3rd stria, the median and apical ones adjacent to 2nd stria. Surface impunctate and impilose, glossy, in anterior two thirds without microreticulation, though very superficial microreticulation present in apical third, consisting of transverse meshes. Fully winged.

Lower surface. Proepisternum with rather sparse though very coarse puncturation. Metepisternum elongate, almost 3× as long as wide. Abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum apparently with one pair of ambulatory setae.

Legs. Medium sized. 5th tarsomer setose on lower surface. 4th tarsomer little excised at apex. Male

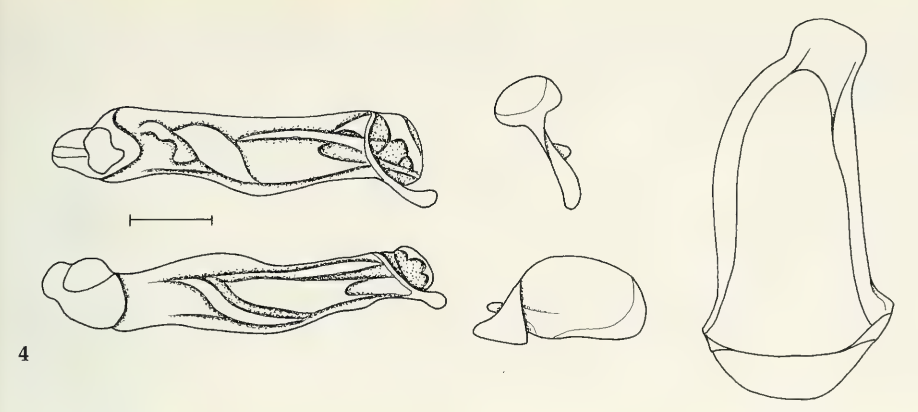


Fig. 4. *Dicraspeda bispinosa* Darlington. Genital ring, parameres, left side and lower surface of aedeagus. Scale: 0.5 mm.

anterior tarsus not enlarged, with a double row of adhesive hairs on 1st-3rd tarsomeres.

♂ genitalia (Fig. 2). Genital ring elongate, almost parallel, with acute apex and slightly irregular lateral margin of arms. Aedeagus elongate, laterally slightly curved, but not sinuate, ventral surface gently concave, apex slightly widened and club-shaped, not turned laterally.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution. Biak Island, western Irian Jaya. Known only from type locality.

Habits. Largely unknown. The holotype was most probably collected in somewhat disturbed lowland rain forest.

Etymology. The name refers to the obsolete striation of the elytra.

Relationships. This species is certainly closely related to the widespread Oriental-Australian species *D. brunnea* Chaudoir and hence belongs to *Dicraspeda* in the original sense, whereas the remaining species from New Guinea and Australia are in various respects different and generally more apomorphic, and actually may belong to different genera.

Dicraspeda bispinosa Darlington

Figs 4, 8, 11

Dicraspeda bispinosa Darlington, 1968, p. 212, fig. 129.

Diagnosis. Rather narrow, convex species with unispinose elytral apex, distinguished from the most closely related species *D. loebli*, spec. nov. by longer elytra, longer apial spines (Fig. 11), more accentuate microreticulation of elytra in both sexes, less convex elytral intervals, and in apical half markedly rough aedeagus with wide apex and with lower surface remarkably bisinuate.

For comparison with the new species described below the ratios of 7 measured specimens of *D. bispinosa* (the type series from MCZ) are dealt with and the male genitalia are for the first time described and figured.

Measurements. Length: 8.5-8.8 mm. Ratios. Width/length of pronotum: 0-95-0.99; width of head/width of pronotum: 1.11-1.15; length/width of elytra: 1.71-1.78.

♂ genitalia (Fig. 4). Genital ring elongate, very stout, slightly asymmetric, slightly narrowed to the wide, rounded apex, with very strong lateral arms. Aedagus moderately elongate, laterally sinuate, lower surface deeply bisinuate, apex short, thin, knob-like, slightly upturned and turned left, with distinct angle on lower surface between aedeagus and apex. Orificium short, with large sclerite on right side. Apical part of aedeagus rough with many small tubercles.

♀ genitalia. Rather similar to that of *D. ullrichi*, spec. nov.

Material examined: 4♂♂, 3♀♀ Dobodura, Papua N. G. Mar-July 1944 Darlington, holotype!, paratypes! (MCZ).

Distribution: According to Darlington (1968) this species is so far known only from a rather restricted area in northeastern and central eastern Papua New Guinea.

Dicraspeda loebli, spec. nov.

Figs 5, 9, 12

Types. Holotype: ♂, Papua Nlle Guinée, Morobe II 81 env. de Gurakor, W. G. Ullrich (MHNG). - Paratype: 1♀, Papua Nlle Guinée W. G. Ullrich, IV 79 PNG/WHProv. Bayer/Rokina (CBM).

Diagnosis. Rather narrow, convex species with unispinose elytral apex, distinguished from the most closely related species *D. bispinosa* Darlington by shorter elytra, shorter spines, less accentuate microreticulation of elytra in both sexes, more convex elytral intervals, and smooth aedeagus with narrow apex and evenly concave lower surface.

Description

Measurements. Length: 8.2-9.0 mm. Ratios. Width/length of pronotum: 0.97; width of head/width of pronotum: 1.12-1.18; length/width of elytra: 1.66.

Colour. Upper and lower surfaces of fore body black, elytra, meso- and methathorax, and abdomen dark piceous. Labrum, palpi, and antenna light reddish. Legs reddish-piceous, apex of tibiae and tarsi feebly lighter.

Head (Fig. 9). Large, slightly wider than pronotum, upper surface slightly convex, though rather uneven. Eyes rather small, by far shorter than orbits, laterally projecting, distinctly interrupting the lateral curve. Orbits convex, <1.5× as long as eye, forming a very wide angle with neck. Clypeus separated by a fine suture that is shortly interrupted in middle. Labrum large, anteriorly faintly concave, 6-setose. Mandibles and palpi of average size, mandibles anteriorly suddenly incurved. Labium with narrow, very elongate tooth. Medially of eye with a strong ridge. Frons in middle near clypeal suture with a horseshoe-shaped impression, laterally on either side with a strongly sinuate, irregular furrow that ends in a deep, elongate groove close to the supraorbital ridge. Medially of this groove with a deep, circular impression on either side. Neck separated from vertex by a shallow, transverse furrow. Posterior supraorbital seta situated far behind posterior margin of eye. Antenna elongate, surpassing base of pronotum by about two antennomeres, median antennomeres c. 3.5× as long as wide. Surface of head apart from labrum without micrireticulation, impunctate and impilose, highly glossy.

Prothorax. Slightly longer than wide, rather parallel, surface rather convex. Widest part slightly in front of middle, margin gently rounded, posteriorly faintly concave. Lateral border prominent, raised throughout and with deep channel. Proepipleura and proepisternum narrowly visible from above. Apex almost straight, unbordered, anterior angles rounded off, barely visible. Base straight, unbordered, posterior angles right though obtuse. Median line deeply impressed, not attaining apex, anterior sulcus shallow, v-shaped, transverse basal sulcus barely impressed, both sulci coarsely punctate. Both marginal setae absent. Surface without microreticulation, impunctate, only anterior and posterior sulcus, lateral channel, and basal third with scattered coarse punctures, in middle with some weak transverse strioles, glossy.

Elytra (Fig. 12). Large in comparison with fore body, fairly elongate, posteriorly slightly widened, lateral margin in anterior third faintly compressed. Surface markedly convex. Shoulders wide, evenly rounded, with small, obtuse angle. Marginal channel narrow. Apex oblique, deeply concave. Outer apical angle projecting but obtuse, sutural angle shortly spined, spines slightly dehiscent, apex with coarse border line. Striae deeply impressed, coarsely, very regularly punctate, intervals distinctly convex. Third interval with three setiferous punctures, the anterior more close to 3rd stria, the median and apical ones adjacent to 2nd stria. Surface in male without microreticulation, in females with highly superficial microreticulation only in apical third, consisting of irregular, transverse meshes. Intervals impunctate and impilose, glossy. Winged.

Lower surface. Proepisternum and mesothorax with dense and coarse puncturation. Metepisternum elongate, c. 2.5× as long as wide. Metathorax and abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum in male with one pair, in females

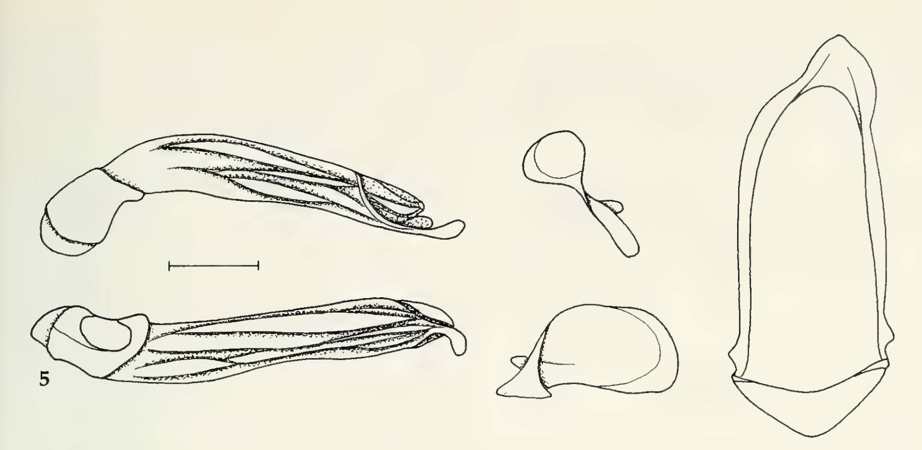


Fig. 5. *D. löbli*, spec. nov. Genital ring, parameres, left side and lower surface of aedeagus. Scale: 0.5 mm.

with two pairs of ambulatory setae.

Legs. Elongate. 5th tarsomer setose on lower surface. 4th tarsomer deeply (>½ of length) excised. Male anterior tarsus not enlarged, with a double row of adhesive hairs on 1st-3rd tarsomeres.

♂ genitalia (Fig. 5). Genital ring narrow and elongate, markedly parallel, apex rather wide, lateral arms moderately strong, base markedly triagonal. Aedagus elongate, narrow, laterally barely sinuate, lower surface regularly concave, apex fairly elongate, thin, slightly knob-like, slightly upturned and markedly turned left, without angle on lower surface between aedeagus and apex. Orificium elongate, with rather small sclerite on right side. Apical part of aedeagus smooth.

♀ genitalia. Rather similar to that of *D. ullrichi*, spec. nov.

Variation. Some variation noted in size of eyes which are slightly larger and more protruding in the female paratype, and in size of punctures of striae which are likewise slightly larger in the female paratype.

Distribution. Eastern and central Papua New Guinea.

Habits. Unknown.

Etymology. Named in honour of Dr. Ivan Löbl of the Museum of Genève who kindly made available the Ullrich collection to me.

Relationships. This species is certainly very closely related to *D. bispinosa* Darlington and also to *D. ullrichi*, spec. nov. and would belong to *Philemonia* when the genus *Dicraspeda* would be acknowledged in its restricted sense.

Dicraspeda ullrichi, spec. nov.

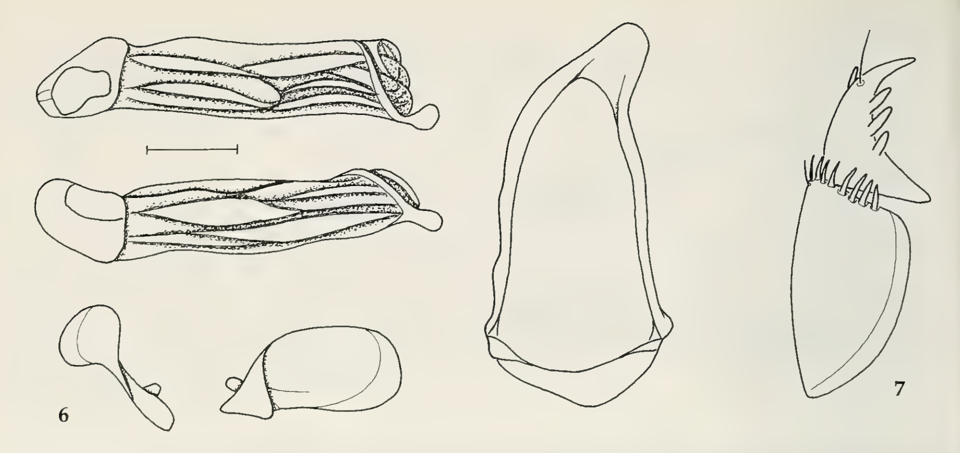
Figs 6, 7, 10, 13

Types. Holotype: ♂, Papua-N.Guinea Mainyanda I.1980 25 km W Bulolo W. G. Ullrich 600 m (MHNG). - Paratypes: 3♀♀, Papua Nlle Guinée W. G. Ullrich, 16 IX 79 PNG/Morobe Umg. Mumeng Wampu River (CBM, MNHG).

Diagnosis. Rather narrow, convex species with denticulate elytral apex, distinguished from the most closely related species *D. bispinosa* Darlington and *D. loebli*, spec. nov. by denticulate rather than spinose sutural apex, smaller eyes that do not interrupt the outline of head, and smooth and near apex distinctly widened aedeagus with apex considerably turned up.

Description

Measurements. Length: 8.0-8.6 mm. Ratios. Width/length of pronotum: 0.94-0.96; width of head/width of pronotum: 1.04-1.08; length/width of elytra: 1.63-1.65.



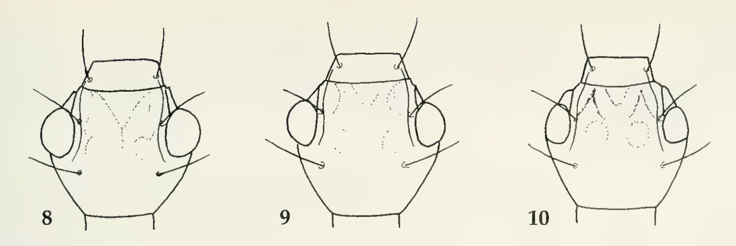
Figs 6-7. *D. ullrichi*, spec. nov. 6. Genital ring, parameres, left side and lower surface of aedeagus. Scale: 0.5 mm. 7. Stylomeres. Scale: 0.2 mm.

Colour. Upper and lower surfaces of fore body black, elytra, meso- and methathorax, and abdomen dark piceous. Labrum, palpi, and antenna light reddish. Legs reddish-piceous, apex of tibiae and tarsi feebly lighter.

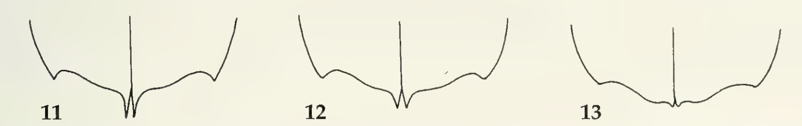
Head (Fig. 10). Large, slightly wider than pronotum, upper surface slightly convex, though rather uneven. Eyes comparatively small, by far shorter than orbits, laterally barely projecting, not interrupting the lateral outline of head. Orbits convex, c. 1.5× as long as eye, forming a very wide angle with neck. Clypeus separated by a fine suture that is shortly interrupted in middle. Labrum large, anteriorly faintly concave, 6-setose. Mandibles and palpi of average size, mandibles anteriorly suddenly incurved. Labium with narrow, very elongate tooth. Medially of eye with a strong ridge. Frons in middle near clypeal suture with a horseshoe-shaped impression, laterally on either side with a markedly sinuate, irregular furrow that ends in a deep, elongate groove close to the supraorbital ridge. Medially of this groove with a deep, circular impression on either side. Neck separated from vertex by a shallow, transverse furrow. Posterior supraorbital seta situated far behind posterior margin of eye. Antenna elongate, surpassing base of pronotum by about two antennomeres, median antennomeres c. 3.5× as long as wide. Surface of head apart from labrum without micrireticulation, impunctate and impilose, highly glossy.

Prothorax. Slightly longer than wide, rather parallel, surface fairly convex. Widest part slightly in front of middle, margin gently rounded, posteriorly faintly concave. Lateral border prominent, raised throughout and with deep channel. Proepipleura and proepisternum narrowly visible from above. Apex almost straight, unbordered, anterior angles rounded off, barely visible. Base straight, unbordered, posterior angles right though obtuse. Median line deeply impressed, not attaining apex, anterior sulcus shallow, v-shaped, transverse basal sulcus barely impressed, both sulci coarsely punctate. Both marginal setae absent. Surface without microreticulation, impunctate, only anterior and posterior sulcus, lateral channel, and basal third with scattered coarse punctures, in posterior half with some weak transverse strioles, glossy.

Elytra (Fig. 13). Large in comparison with fore body, fairly elongate, posteriorly slightly widened, lateral margin in anterior third faintly compressed. Surface markedly convex. Shoulders wide, evenly rounded, with small, obtuse angle. Marginal channel narrow. Apex oblique, deeply concave. Outer apical angle projecting but obtuse, sutural angle denticulate, apex with coarse border line. Striae deeply impressed, coarsely, very regularly punctate, intervals distinctly convex. Third interval with three setiferous punctures, the anterior more close to 3rd stria, the median and apical ones adjacent to 2nd stria. Surface in male without microreticulation, in females with highly superficial microreticulation only in apical third, consisting of irregular, transverse meshes. Intervals impunctate and impilose, glossy. Winged.



Figs 8-10. Head. 8. *Dicraspeda bispinosa* Darlington. 9. *D. löbli*, spec. nov. 10. *D. ullrichi*, spec. nov.



Figs 11-13. Apex of elytra. 11. *Dicraspeda bispinosa* Darlington. 12. *D. löbli*, spec. nov. 13. *D. ullrichi*, spec. nov.

Lower surface. Proepisternum and mesothorax with dense and coarse puncturation. Metepisternum elongate, c. 2.5× as long as wide. Metathorax and abdominal sterna impunctate and impilose apart from a pair of ambulatory setae each segment. Terminal sternum in male with one pair, in females with two pairs of ambulatory setae.

Legs. Elongate. 5th tarsomer setose on lower surface. 4th tarsomer very deeply (>½ of length) excised. Male anterior tarsus not enlarged, with a double row of adhesive hairs on 1st-3rd tarsomeres.

♂ genitalia (Fig. 6). Genital ring elongate, fairly stout, slightly asymmetric, slightly narrowed to the moderately wide, rounded apex. Aedagus moderately elongate, laterally little sinuate, lower surface very gently bisinuate, apex short, thin, knob-like, distinctly upturned but barely turned left, with feeble angle on lower surface between aedeagus and apex. Orificium very short, with large sclerite on right side. Apical part of aedeagus smooth.

♀ genitalia (Fig. 7). Stylomere 2 rather elongate, slightly curved, with acute apex; with 3 stout ventral ensiform setae, a large dorsal ensiform seta, and a rather short nematiform seta raising from a groove in apical third. Base of stylomere 1 medially with 5-6 stout ensiform setae, laterally with additional 3 more slender, rather nematiform setae.

Variation. Very little variation noted.

Distribution. Eastern central Papua New Guinea.

Habits. Unknown.

Etymology. Named in honour of the collector W. G. Ullrich.

Relationships. This species is certainly closely related to *D. bispinosa* Darlington and *D. loebli*, spec. nov. and would belong to *Philemonia* when the genus *Dicraspeda* would be acknowledged in its restricted sense.

Due to their high external similarity the three taxa *D. bispinosa*, *D. loebli*, and *D. ullrichi* could be regarded as members of a superspecies, but their partly sympatric distribution and the rather important differences of the structure of the male genitalia do not support this idea. While in certain external features (shape of head, elytral spines) *D. bispinosa* and *D. loebli* seem to be more similar (Figs 8, 9, 11, 12), in structure of aedeagus *D. bispinosa* and *D. ullrichi* are more alike (Fig. 4, 6). The actual relationships of the three species are, therefore, still uncertain.

Certainly the species of the *bispinosa*-group are more advanced in many external and genitalic respects than those of the *brunnea*-group that constitute the most generalized members of the genus. In a future revision of all species of *Dicraspeda* including the Australian ones, it might be necessary to subdivise the genus again and to reintroduce the old generic names *Philemonia* Liebke and *Macrocentra* Chaudoir at least as subgeneric names.

Acknowledgements

My sincere thanks are due to Dr. I. Löbl (Genève), Dr. P. D. Perkins (Cambridge, Mass.), Mr. A. Riedel (Friedberg), Dr. W. Schawaller (Stuttgart), and Dr. H. Schönmann (Wien) for kind loan of types and material.

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SPIXIANA	**19**	2	147–154	München, 01. Juli 1996	ISSN 0341–8391

Forschungen über die Pselaphidae Siziliens. XI. Eine neue Art der Gattung *Pselaphostomus* Reitter, 1909 aus Sizilien und Betrachtungen über die Arten der *kiesenwetteri*-Gruppe*

(Insecta, Coleoptera, Pselaphidae)

Von **Giorgio Sabella**

Sabella, G. (1996): Studies on the Pselaphidae of Sicily. XI. A new sicilian species of *Pselaphostomus* Reitter, 1909 with considerations about the species of the *kiesenwetteri*-group (Insecta, Coleoptera, Pselaphidae) – Spixiana **19/2:** 147-154

The author describes a new Sicilian species of *Pselaphostomus* Reitter, 1909, *P. adornoi*, spec. nov., closely related to *P. globiventris*, from which it can be essentially distinguished by the aedeagus morphology and the larger and deeper median pit of the pronotum. The new species belongs to the *kiesenwetteri*-group, with a Sardinian-Sicilian-Corsican geonomy, that is composed of nine species: three from Corsica (*P. kiesenwetteri*, *P. revelierei* and *P. medius*); four from Sardinia (*P. ganglbaueri*, *P. argutus*, *P. sardous*, and *P. insulcatulus*) and two from Sicily (*P. globiventris* and *P. adornoi*, spec. nov.). They are distinguishable on the basis of several external morphological characteristics (head length/width ratio; head reticulate and more or less opaque or shiny; antennae with segments 3-8 more or less prolonged; club of the last segment of the palpi more or less developed; depression between the frontal tubercules more or less deep; eyes more or less developed; interocular pits either big or small; humeral carina of the elytra more or less prolonged and protruding); and from the apex morphology of the basal capsule and of the ventral lamina of the aedeagus. For each species the distribution and some distinctive characters are specified. The genus *Pselaphogenius* Reitter, 1910 is considered valid and not synonymous with *Dicentrius* Reitter, 1882.

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Einleitung

Pselaphostomus ist eine westpalaearktische Gattung mit gegenwärtig 21 bekannten Arten (Besuchet 1961: 232; Newton & Chandler 1989: 63). Sie wurde von Reitter aufgestellt (1909: 218, Typusart *Pselaphus stussineri* Reitter, 1881) und gegenüber den anderen damals bekannten Pselaphini anhand der folgenden Merkmale charakterisiert: Elytren verkürzt, eindeutig breiter als lang; Augen klein; Endglied der Maxillarpalpen lang, keulenförmig und unbehaart; Kopf durch eine deutliche ventrale Vorwölbung verdickt, ohne einen tomentierten Bereich auf der Unterseite; erstes Abdominaltergit sehr groß, konvex. Ein Jahr später teilte derselbe Autor (Reitter 1910: 154) die Gattung *Pselaphostomus* in zwei Untergattungen auf, *Pselaphostomus* s. str. und *Pselaphogenius*, die er aufgrund folgender Charakteristika für natürliche Einheiten hielt: Elytren mit nur einem einzigen, mehr oder weniger entwickelten Humeralkiel und nur einem Basalgrübchen bei *Pselaphostomus* (bei *Pselaphogenius* findet sich außer

* Mit Unterstützung aus Mitteln des M.P.I. 40 %, Programm "Fauna dell'area mediterranea occidentale" Koordinator: Prof. D. Caruso.

dem Humeralkiel noch ein weiterer Kiel, der zwischen den beiden Basalgrübchen verläuft); Metasternum der Männchen bei *Pselaphostomus* wenig erhoben und posterior durch zwei divergierende Kiele begrenzt (gewöhnlich konisch aufgewölbt bei *Pselaphogenius*). Aus heutiger Sicht sind diese beiden Untergattungen aufgrund der von Reitter richtig erkannten Merkmale als wohldefinierte eigenständige Gattungen anzuerkennen. Besuchet (1968: 295) hat vorgeschlagen, *Pselaphogenius* als Synonym von *Dicentrius* Reitter, 1882 zu betrachten - ein Vorschlag, der jüngst auch von Newton & Chandler (1989: 63) wiederholt wurde -, doch derselbe Autor hat (1980: 630) eine neue Art von Circeo (Latium) unter dem Namen *Pselaphogenius latinus* (und nicht *Dicentrius latinus*) beschrieben, da er die beiden Gattungen inzwischen nicht mehr als synonym betrachtete (Besuchet, pers. comm.). Aufgrund des Unterschiedes in der Morphologie des Palpenendglieds (gekeult bei *Pselaphogenius*, fein und zugespitzt bei *Dicentrius*) sind diese beiden Gattungen als zwar nahe verwandt, aber doch deutlich getrennt zu betrachten.

Wiederum war es Reitter, der wenig später (1918: 75) die Ansicht vertrat, daß sich die damals bekannten palaearktischen Gattungen der Pselaphini in zwei große natürliche Gruppen aufteilen lassen. Die erste umfaßt die Gattungen *Pselaphopterus* Reitter, 1891 (mit der Untergattung *Faradayus* Reitter, 1909) und *Pselaphus* Herbst, 1792 (mit der Untergattung *Pselaphaulax* Reitter, 1909), mit stets geflügelten Arten, deren Elytren lang sind und einen vollständigen Humeralkiel sowie hervorstehende Schulterbeulen tragen, deren Kopf einen tomentierten ventralen Bereich aufweist und deren erstes Abdominalsternit kürzer ist als der Rest des Abdomens. Zur zweiten Gruppe, mit flügellosen Arten, deren Elytren kurz sind und nur schwach angedeutete Schulterbeulen sowie 1-2 sehr kurze Humeralkiele tragen, deren Kopfunterseite keine tomentöse Zone aufweist und deren vorderstes Abdominalsternit länger ist als der Rest des Abdomens, rechnete er die Gattungen *Dicentrius* und *Pselaphostomus*. Der letzteren Gattung gehören nach Ansicht des Autors (p. 75, Anm. 4) alle terricolen Arten von *Pselaphus* an, die unter den Nummern 20-27 im "Genera et Catalogue des Psélaphides" von Raffray (1904) enthalten sind, unter diesen viele, die heute zur Gattung *Pselaphogenius* gerechnet werden. Auf diese letztere Gattung nimmt Reitter jedoch in keiner Weise Bezug. Auch Karaman (1940) berücksichtigt nur die Gattung *Pselaphostomus* und erwähnt *Pselaphogenius* weder als Untergattung, noch als Synonym der ersteren, obwohl sie unter dem Namen *Pselaphostomus* zahlreiche Arten aufzählt, die heute zu *Pselaphogenius* zu stellen sind.

Jeannel (1950, 1951) unterteilt die Gattung *Pselaphostomus* in drei Untergattungen: *Pselaphostomus* s. str., *Pselaphogenius* und *Afropselaphus* Jeannel, 1950, die heute alle drei als einander nahestehende, aber deutlich voneinander unterschiedene Gattungen anzusehen sind. Derselbe Autor errichtet außerdem die Gattung *Pselaphopsis* Jeannel, 1950 und teilt sie in zwei Untergattungen: *Pselaphodinus* Jeannel, 1950, heute synonym zu *Pselaphogenius*, und *Pselaphopsis* s. str., die als Synonym von *Pselaphostomus* anzusehen ist. Bei der Neudefinition von *Pselaphostomus* arbeitete Besuchet (1961) innerhalb der Gattung fünf phyletische Linien heraus, unter denen eine, die *kiesenwetteri*-Gruppe, alle *Pselaphopsis*-artigen Arten vereinigt. Diesen gemeinsame Merkmale sind die große Grube auf dem ersten Abdominalsternit der Männchen und die stets wohlentwickelte, von der capsula basalis ausgehende Ventrallamina auf dem Aedeagus. Es handelt sich um eine Gruppe mit Corso-Sardo-Siculischer Verbreitung, die bis jetzt acht Arten zählt und in Sizilien nur durch *Pselaphostomus globiventris* Reitter, 1904 vertreten war.

Die im folgenden beschriebene zweite sizilianische Art aus der *kiesenwetteri*-Gruppe stammt aus der Provinz Trapani (Westsizilien); sie ist in ihrer äußeren Morphologie *globiventris* recht ähnlich, unterscheidet sich jedoch eindeutig in der Gestalt des Aedeagus. Da es mir in den vergangenen Jahren möglich war, die meisten der *Pselaphostomus*-Arten der *kiesenwetteri*-Gruppe zu untersuchen, ergreife ich hier die Gelegenheit, diese alle mit einzubeziehen und einige noch wenig klare Aspekte ihrer Morphologie und Verbreitung vorzustellen.

Die genetzte und eher opake Oberfläche des Kopfes erlaubt, die sardischen Arten *(P. ganglbaueri, argutus, sardous* und *insulcatulus)* leicht und zweifelsfrei von den korsischen und sizilianischen zu unterscheiden, die stets eine glänzende Kopfoberfläche besitzen (mit Ausnahme von *P. globiventris*, dessen Kopf im hinteren Bereich schwach retikuliert ist). Ansonsten konnte ich feststellen, wie ähnlich sich viele Arten der *kiesenwetteri*-Gruppe sind. Die wichtigen Unterscheidungsmerkmale des Exoskeletts betreffen das Verhältnis Länge/Breite des Kopfes und die Beschaffenheit seiner Oberfläche (retikuliert und opak oder glänzend), die Gestalt der Glieder des Antennen-Funiculus (mehr oder weniger verlängert), die Form der Keule des Endgliedes der Maxillarpalpen (mehr oder weniger stark angeschwollen), die Tiefe der Grube zwischen den Frontaltuberkeln, die Ausbildung der Augen, die

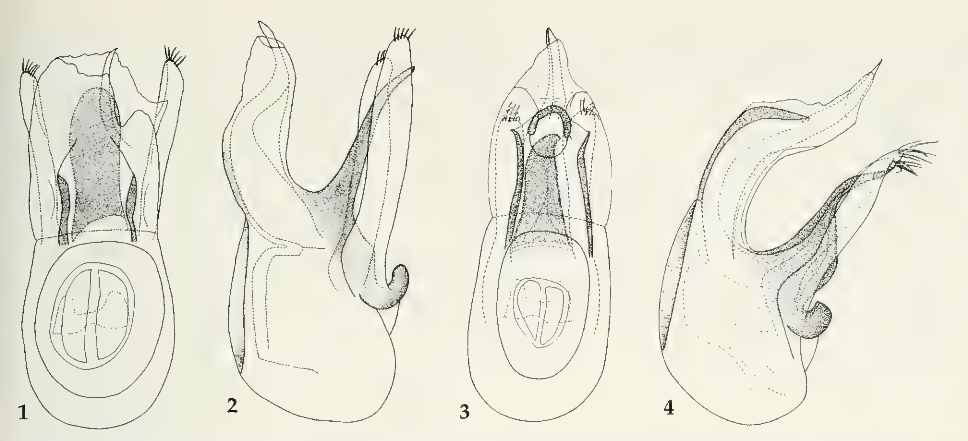


Abb. 1, 2. *Pselaphostomus adornoi*, spec. nov., Holotypus, Aedeagus (ZSM). 1. Dorsalansicht. 2. Seitenansicht. Abb. 3, 4. *Pselaphostomus globiventris* (Reitter), Exemplar aus dem Bosco del Fanuso (Ficuzza, Palermo) in Coll. Sabella. 3. Dorsalansicht. 4. Lateralansicht.

Größe der Interokulargrübchen, sowie Länge und Aufwölbung des Humeralkiels der Elytren. Diese Merkmale sind zwar grundsätzlich für die Trennung der Taxa tauglich, lassen jedoch aufgrund der intraspezifischen Variabilität gelegentlich auch Zweifel offen.

Konstante diagnostische Merkmale finden sich hingegen in der Morphologie des Aedeagus, und zwar in der Gestalt des Apex sowohl der capsula basalis, als auch der lamina ventralis; die Form der Parameren erweist sich dagegen als von geringem diagnostischem Wert. Aus diesem Grunde schien es mir angebracht, den apikalen Bereich der Aedeagi aller Arten der *kiesenwetteri*-Gruppe schematisch in Lateralansicht so abzubilden, daß nur die capsula basalis und die lamina ventralis hervorgehoben sind. Um den Vergleich mit dem nah verwandten *P. adornoi*, spec. nov.zu erleichtern, habe ich hingegen den Aedeagus von *P. globiventris*, der übrigens noch nie abgebildet worden ist, vollständig dargestellt.

Pselaphostomus adornoi, spec. nov.

Abb. 1, 2, 12

Typen. Holotypus: ♂, Sizilien, Abhänge von Erice Richtung Valderice (U.T.M. Koordinaten TC8812) (Erice, Trapani), 600 m NN, 10.12.1993 (ZSM). - Paratypen: 1♀, dito (ZSM); 2♂♂, 1♀, dito (Mus. Stor. Nat. Genf); 1♂, 2♀♀, dito (Coll. Sabella); 2♂♂, dito, 03.03.1994 (Coll. Sabella); 1♀, Erice, Steineichenwald (Erice, Trapani), 02.01.1995 Gardini leg. (Coll. Sabella); 3♀♀, Abhänge Monte Inici (U.T.M. UC1208) (Castellammare del Golfo, Trapani), 900 m NN., 03.03.1994 (Coll. Sabella).

Beschreibung

Länge 1.85-2.1 mm, Färbung einheitlich hellbraun, Palpen rötlich. Die Behaarung besteht aus langen, goldglänzenden, anliegenden Haaren, in Gruppen auf den Seiten der Schläfen, verstreut auf dem Pronotum, und auf jeder der Elytren in zwei parallelen Reihen angeordnet sind, die eine nahe der Naht, die andere quasi in Fortsetzung des Schulterkiels. Kurze gelbe Haare finden sich reichlich an der Spitze der Elytren und auf dem Vorderrand des ersten Abdominaltergits und -sternits.

Der Kopf ist eindeutig länger (0.37-0.38 mm) als breit (0.25 mm), mit schmalem (0.13-0.15 mm) Frontallobus, der in der Mitte durch eine Längsfurche tief eingeschnitten ist. Die Ränder dieser Furche sind kräftig erhoben und enden auf der Höhe zweier deutlich eingegrabener Interoculagrübchen, welche um das doppelte ihres Durchmessers voneinander entfernt sind. Die Augen sind klein, bestehend aus 7-8 Ommatidien, die Schläfen kurz und abgerundet. Das Endglied der Maxillarpalpen ist 0.38-0.39 mm lang; die Endkeule, die mehr als ein Drittel ihrer Länge einnimmt, ist apikal durch eine

breite, wenig eingetiefte Rinne eingeschnitten, die sich, allmählich verschmälert, ungefähr über die Hälfte der Keule erstreckt. Das Integument des Kopfes ist glänzend, ohne irgendeine Spur von Punktierung oder Retikulation. Die Antennen sind relativ lang (0.88-1.00 mm), der Scapus doppelt so lang als breit, der eiförmige Pedicellus wenig länger als breit und breiter als alle Glieder des Funiculus. Die Antennenglieder 3, 5 und 6 sind wenig länger als breit, die Glieder 4 und 8 so lang wie breit, aber das Glied 7 eindeutig länger als breit. Die Antennenkeule, die nicht deutlich vom Funiculus abgesetzt ist, wird von den letzten drei Gliedern gebildet, die sich vom 9 zum 11 allmählich und nur geringfügig verbreitern. Das 9 und 10 Glied sind so lang wie breit, das Endglied ist deutlich länger als breit und länger als die drei vorhergehenden Glieder zusammen.

Das Pronotum ist eindeutig länger (0.38-0.40 mm) als breit (0.28-0.30 mm), erreicht seine größte Breite auf halber Länge, ist posterior nur geringfügig, anterior aber deutlicher verschmälert und hier schwach gebuchtet. An seiner Basis findet sich ein medianes Grübchen, das größer und deutlicher eingegraben ist als die lateralen, die sich an den Hinterecken befinden. Das Tegument ist glatt und glänzend.

Die Elytren sind deutlich quer (Länge 0.40-0.42, Breite 0.61-0.65 mm) und von der Basis zum Apex hin stark verbreitert. Auf jeder Elytre findet sich ein großes und tiefes basales Grübchen, das seitlich von einem klar erkennbaren Humeralkiel begrenzt wird, der sich ungefähr über ein Drittel der Länge der Elytren erstreckt.

Das Abdomen ist sehr groß, sein erstes Tergit ist länger als alle übrigen zusammen; seine Scheibe ist wenig länger (0.59-0.60 mm) als breit (0.55-0.56 mm) und in der Mitte leicht aufgewölbt.

Die Femora aller Beine sind in der Mitte verdickt, die Mitteltibien distal leicht verbreitert.

Sondermerkmale des Männchens: Metasternum tiefer eingedrückt, mit stark aufgewölbten Rändern, die richtiggehende Kiele bilden. Das erste Abdominalsternit mit einem eiförmigen Grübchen, das seinen ganzen Medianbereich einnimmt. Aedeagus (Abb. 1-2) 0.30-0.31 mm lang; der Apex seiner großen capsula basalis endet in einer dorsad gerichteten Spitze, lamina ventralis stark sklerifiziert, in einer ventrad gerichteten Spitze endend.

P. adornoi, spec. nov. ist wahrscheinlich eine waldbewohnende Art des Fallaubs, sind doch alle Exemplare beim Sieben von Fallaub in Steineichen- oder Mischwald (Steineiche, Ahorn, Flaumeiche, Esche) gefunden worden. Gemeinsam mit der neuen Art fand ich *Amaurops sulcatula sulcatula* Dodero 1919, *Trimium zoufali* Krauss, 1900 und *Euplectus bonvouloiri siculus* Raffray, 1910.

Die neue Art ist meinem Freund und Kollegen Antonio Adorno gewidmet, der mir in den letzten Jahren eine große Hilfe beim Sammeln von Käfern war und mir stets großzügig die von ihm gesammelten Pselaphiden überlassen hat.

Diskussion. *Pselaphostomus adornoi*, spec. nov. steht *P. globiventris* sehr nahe, von dem er sich jedoch leicht aufgrund der Morphologie des Apikalbereiches des Aedeagus unterscheiden läßt. Bei *P. globiventris* endet der Apex der capsula basalis in eine stärker sklerifizierte und weniger stark dorsad aufgebogene Spitze (Abb. 4); außerdem ist die lamina ventralis bei *P. adornoi* gleichmäßig spitz zulaufend, während sie bei *P. globiventris* basal stark verdickt, unterhalb der Spitze aber abrupt verengt ist (vergl. Abb. 2 und 11 mit Abb. 4 und 12). Die Unterscheidung der beiden Arten anhand von Merkmalen des Exoskeletts erweist sich als schwieriger, wenngleich durchaus möglich. Die Occipitalregion des Kopfes von *P. globiventris* ist schwach, aber eindeutig genetzt, also nicht glänzend, während in *P. adornoi* dieser Bereich immer glänzend ist, ohne irgendeine Spur von Punktierung oder Retikulierung. Das auffallendste Merkmal findet sich jedoch in den Abmessungen des medialen Basalgrübchens des Pronotums das bei *P. adornoi* breit und deutlich erkennbar ist, bei *P. globiventris* hingegen klein, manchmal geradezu winzig und sehr schwer zu erkennen. Ein weiteres Merkmal findet sich in der Wölbung der Scheibe des ersten Abdominaltergites. Diese ist bei *P. globiventris* eindeutig konvex und im medianen Posteriorbereich aufgewölbt und überragt in Seitenansicht deutlich die Seitenränder des Tergits, während bei *P. adornoi* die Aufwölbung weniger stark ist und nicht über die Seitenränder des Tergites hinausragt. Schließlich ist das mediane Grübchen des ersten Abdominalsternites der Männchen bei *P. adornoi* vor allem anterior schmäler als bei *P. globiventris*.

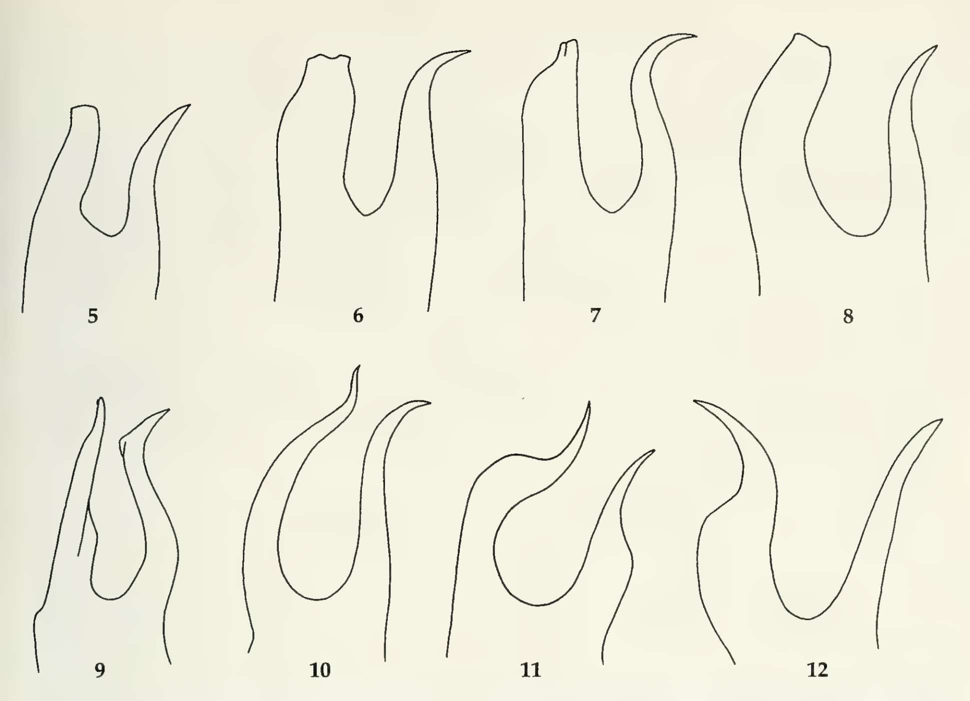


Abb. 5-12. Apikalbereich der Aedeagi der *Pselaphostomus*-Arten aus der *kiesenwetteri*-Gruppe. Schematische Darstellung in Seitenansicht, Parameren nicht berücksichtigt. 5. *P. kiesenwetteri* (Reitter). 6. *P. revelierei* (Reitter). 7. *P. medius* (Sainte Claire Deville). 8. *P. sardous* (Dodero). 9. *P. ganglbaueri* (Reitter). 10. *P. argutus* (Reitter). 11. *P. globiventris* (Reitter). 12. *P. adornoi*, spec. nov.

Pselaphostomus kiesenwetteri (Reitter, 1881)

Abb. 5

Abbildungen des Aedeagus: Karaman 1940: 125, Abb. 11a, b, c; Jeannel 1950: 392, Abb. 162a.

Es handelt sich um eine Art *in litteris* von Saulcy, die bereits von Bertolini (1873: 74) für Korsika genannt wurde, bevor Reitter sie 1881 beschrieb. Bertolini (1889: 43) und Ragusa (1892: 78) erwähnen sie auch für Sizilien, doch nachfolgend korrigiert Ragusa (1905: 231) sich selbst und vertritt die Ansicht, daß seine vorhergehende Meldung nicht auf *P. kiesenwetteri*, sondern auf eine neue, damals noch nicht beschriebene Art zu beziehen sei, die von Holdhaus und Dodero in Fiumedinisi (Messina) gesammelt wurde und *P. fiorii*, *P. conosternum* und *P. calabrus* nahesteht. In dieser Art läßt sich leicht *Pselaphogenius peloritanus* (Holdhaus, 1910) wiedererkennen. Wiederum Raffray (1924: 48) und Karaman (1940: 126) melden *P. kiesenwetteri* irrtümlicherweise auch aus Sardinien.

P. kiesenwetteri ist also ein korsischer Endemit. Er unterscheidet sich von den anderen beiden korsischen Arten (in Klammern) durch den doppelt so langen wie breiten Kopf (höchstens anderthalb mal so lang bei *revelieri* und *medius*), durch die kürzere Keule des Palpenendgliedes (1/4 der Gesamtlänge des Gliedes, 1/3 bei den anderen beiden Arten), durch den längeren Fühler mit einem Funiculus, dessen Glieder doppelt so lang wie breit sind (höchstens anderthalb mal so lang wie breit in *P. revelierei* und *P. medius*), durch den deutlich sichtbaren Humeralkiel der Elytren, der ungefähr die Hälfte der Länge der Elytren erreicht und schließlich in der Morphologie des Aedeagus (Abb. 5).

Pselaphostomus revelierei (Reitter, 1881)
Abb. 6

Abbildungen des Aedeagus: Karaman 1940: 125, Abb. 11d, e, f: Jeannel 1950: 392, Abb. 162b.

Es handelt sich um eine Art *in litteris* von Saulcy, die bereits von Bertolini (1873: 74) für Korsika genannt wurde, bevor Reitter sie 1881 beschrieb. Raffray (1924: 48), Porta (1926: 265) und Karaman (1940: 125) melden sie irrtümlicherweise auch für Sardinien. Früher als diese hatte bereits Sainte Claire Deville (1908: 151) diese Art für Sardinien erwähnt unter Bezugnahme auf Dodero, welcher sie jedoch (1919: 235) ausschließlich für Korsika meldet. Jeannel (1950: 393) hat darüberhinaus zwei Unterarten beschrieben, beide aus Korsika, *P. revelierei minor* und *P. r. frontalis*, die mit größter Wahrscheinlichkeit als Synonyme von *revelierei* zu betrachten sein dürften; da ich die Typen nicht überprüft habe, kann ich diese Synonymie jedoch nicht mit letzter Sicherheit bestätigen.

P. revelierei ist ein korsischer Endemit. Er unterscheidet sich von den anderen beiden korsischen Arten aus dieser Gruppe durch den praktisch vollkommen fehlenden Humeralkiel der Elytren, der auf eine kleine Erhebung reduziert ist, die an der Basis der Elytren sichtbar ist, durch die sehr kurzen Antennen mit Gliedern des Funiculus, die kaum länger als breit sind und in der Morphologie des Aedeagus (Abb. 6).

Pselaphostomus ganglbaueri (Reitter, 1881)
Abb. 9

Reitter beschrieb diese Art anhand eines Männchens, von dem er irrtümlicherweise annahm, daß es aus Korsika stamme; Baudi (1889: 169) und Bertolini (1889: 43) melden sie daraufhin für Korsika. Sowohl Sainte Claire Deville (1908: 152) als auch Holdhaus (1910: 49, Anm. 1) äußern Zweifel an der Herkunft des Typus von *P. ganglbaueri* und melden die Art mit Sicherheit nur für Sardinien. Eben Sainte Claire Deville schließt später (1914: 523) *P. ganglbaueri* und auch *Pselaphostomus argutus* (Reitter 1881) aus der korsischen Fauna aus indem er beweist, Etiketten der Exemplare, aufgrund deren Reitter die beiden Arten beschrieben hatte, sich auf den Wohnsitz des Sammlers, nicht jedoch auf die Herkunft des Materials bezogen. *P. ganglbaueri* ist demnach eine für Sardinien endemische Art. Sie unterscheidet sich von den anderen sardischen Arten der *kiesenwetteri*-Gruppe durch den dichter retikulierten Kopf, den nur eben an der Basis der Elytren sichtbaren Humeralkiel, die nur wenig längeren als breiten Glieder des Funiculus der Fühler, den sehr langen ersten Abdominaltergit (nur wenig breiter als lang) und in der Morphologie des Aedeagus (Abb. 9).

Pselaphostomus argutus (Reitter, 1881)
Abb. 10

Abbildungen des Aedeagus: Poggi 1992: 185, Abb. 49-50.

Wie die vorhergehende Art, wurde auch diese anhand von Material beschrieben, von dem Reitter annahm, es stamme aus Korsika, für das Sainte Claire Deville (1914: 523) jedoch die tatsächliche Herkunft aus Sardinien bewiesen hat. Die Meldung aus Kalabrien (Serra San Bruno, Baudi 1889: 168) beruht sicherlich auf einem Irrtum. Nach Ansicht von Besuchet (pers. comm.) ist *Pselaphostomus provincialis* (Dodero 1919), der nach einem einzigen weiblichen, in Var (Südfrankreich) gesammelten Exemplar beschrieben wurde, wahrscheinlich ein Synonym von *P. argutus*. Besuchet bezweifelt auch, daß der Typus von *P. provincialis* tatsächlich aus Südfrankreich stammt.

Es handelt sich um eine endemische Art Nordsardiniens, die in letzter Zeit von Poggi (1992: 184) auch für die Insel Figarolo gemeldet wurde. Die Art läßt sich recht leicht von den anderen sardischen Arten der Gruppe unterscheiden aufgrund der stark vorstehenden Schultern der Elytren, der gut sichtbaren und über ungefähr die halbe Länge der Elytren ausgedehnten Humeralkiele und schließlich in der Morphologie des Aedeagus (Abb. 10).

Pselaphostomus globiventris (Reitter, 1904)
Abb. 3, 4, 11

Pselaphostomus leonhardi Reitter, 1910 (syn. Dodero 1919).

Ein sizilianischer Endemit, der *P. adornoi* recht nahesteht, von welchem er sich hauptsächlich in der Morphologie des Aedeagus (Abb. 3, 4, 11) und in den oben besprochenen Merkmalen des Exoskeletts unterscheidet. Er ist mir aus den Bergzügen der Madonie, der Sicani und der Erei bekannt, in den westlichsten Teilen der Insel scheint er durch *P. adornoi* ersetzt zu sein.

Pselaphostomus sardous (Dodero, 1919)
Abb. 8

Ein sardischer Endemit, der von Bertolini (1889: 43) für Sardinien bereits wörtlich als "*Pselaphus sardous* Dodero" gemeldet wird, dreißig Jahre vor der Originalbeschreibung durch Dodero. Er steht *P. argutus* nahe, von dem er sich jedoch unterscheidet durch den kürzeren Kopf (etwa anderthalb mal so lang wie breit), die kürzeren Fühler, deren Funiculus-Glieder wenig länger als breit sind, die kürzeren Humeralkiele, die nicht vorstehenden Schultern der Elytren und schließlich in der Morphologie des Aedeagus (Abb. 8). Dodero unterscheidet noch eine Varietät *banariensis* aus Nordsardinien, die von der typischen Form abweicht in den eindeutig kleineren Okulargrübchen und auf dem ersten Abdominalsternit des Männchens in dem mehr ovalen, kürzeren Mediangrübchen, das zur Basis des Segments hin verkürzt, und zum Apex hin zugespitzt ist. Da ich nie Material von dieser Varietät zu Gesicht bekommen habe, kann ich mich zu ihrer taxonomischen Bedeutung nicht äußern.

Pselaphostomus insulcatulus (Dodero, 1919)

Ein sardischer Endemit, der bis jetzt nur in einem einzigen, bei Dorgali gesammelten weiblichen Exemplar bekannt ist, das ich bisher nicht habe überprüfen können. Die Einreihung in die *kiesenwetteri*-Gruppe basiert auf der Ähnlichkeit mit *P. ganglbaueri*, sollte jedoch verifiziert werden, wenn das Männchen von *P. insulcatulus* bekannt wird. Die Art unterscheidet sich von allen anderen dieser Gruppe darin, daß der vordere Abschnitt des Kopfes nicht von einer Längsfurche eingeschnitten ist.

Pselaphostomus medius (Sainte Claire Deville, 1926)
Abb. 7

Abbildungen des Aedeagus: Jeannel 1950: 392, Abb. 162c.

Ein Endemit von Zentralkorsika, *P. revelierei* nahestehend, von dem er sich unterscheidet durch die bedeutendere Körpergröße (2.0-2.2 gegen 1.55-1.8 mm), den längeren Humeralkiel der Elytren, der ca. 1/4 der Länge der Elytre einnimmt, die längeren Antennen, deren Funiculus-Glieder anderthalbmal so lang wie breit sind, und schließlich durch die Morphologie des Aedeagus (Abb. 7).

Danksagung

Ich danke Antonio Adorno und Antonio Alicata, meinen Begleitern auf zahlreichen Exkursionen und Helfern beim Sammeln einer umfangreichen Käferausbeute, in der ich auch die hier beschriebene neue Art entdeckte. Ich danke außerdem Frau Dr. N. Berti. Mus. Nat. Hist. Natur. Paris, Herrn C. Bückle, Tübingen, und Herrn Dr. G. Coulon, Inst. Royal Sci. Nat. Bruxelles, die mir durch Materialausleihe die Untersuchung zahlreicher Arten der *kiesenwetteri*-Gruppe ermöglicht haben. Ein besonderer Dank geht an Herrn Dr. C. Besuchet, Mus. Hist. Nat. Genéve, der mir nicht nur seine Sammlung verfügbar gemacht hat, sondern auch Aspekte der vorliegenden Arbeit mit mir besprochen und mir überaus nützliche Vorschläge gemacht hat. Ein herzlicher Dank schließlich meinen Freunden und Kollegen C. Bückle und R. Gerecke in Tübingen, die sich mit Vergnügen über die Aufgabe hergemacht haben, diesen Text in ihre Muttersprache zu übersetzen und dabei auch noch in seinen Inhalt hier und da eingegriffen haben, hoffentlich zu seinem Vorteil.

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Internal classification of the genus *Dasytidius* Schilsky with descriptions of new species of the subfamily Chaetomalachiinae

(Insecta, Coleoptera, Dasytidae)

By **Karel Majer**

Majer, K. (1996): Internal classification of the genus *Dasytidius* Schilsky with descriptions of new species of the subfamily Chaetomalachiinae (Insecta, Coleoptera, Dasytidae). – Spixiana **19/2:** 155-182

The species of the genus *Dasytidius* Schilsky are reviewed, ideas to the internal classification and biogeography of the genus are provided. Fourteen new species are described: *Achaetomalachius rosti*, spec. nov. (N India), *Dasytidius brevicornis*, spec. nov. (Turkey), *D. clarkei*, spec. nov. (Ethiopia), *D. crassicornis*, spec. nov. (Syria), *D. endroedyi*, spec. nov. (Ghana), *D. impar*, spec. nov. (Turkey), *D. insularis*, spec. nov. (Greece: Lesvos), *D. malkini*, spec. nov. (Turkey), *D. marsaleki*, spec. nov. (Kyrgyzstan), *D. muehlei*, spec. nov. (Yemen), *D. recticollis*, spec. nov. (Syria), *D. turnai*, spec. nov. (China), *Dasytiscus strejcekorum*, spec. nov. (Armenia), *Mimothrix pamirensis*, spec. nov. (Tajikistan).

The male of *D. wittmeri* Majer and the female of *D. inchoatus* Majer are described. Five *Dasytiscus*-species are transferred to *Dasytidius*: *Dasytidius sudanicus* (Pic), comb. nov., *D. atrimembris* (Pic), comb. nov., *D. desaegeri* (Pic), comb. nov., *D. deportatus* (Peyerimhoff), comb. nov., and *D. licenti* (Pic), comb. nov. Two new synonyms are proposed: *Dasytiscus scotti* Wittmer, syn. nov. of *Dasytidius atrimembris* (Pic), *Dasytiscus ruficollis* var. *bicoloriceps* Pic, syn. nov. of *Dasytiscus minimus* J. Sahlberg. A classification of the genus *Dasytidius* into species group is provided.

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Introduction

The present contribution is a complementary study on the subfamily Chaetomalachiinae of Dasytidae, chiefly on the genus *Dasytidius* Schilsky, its classification, redescriptions of some of Pic`s species and descriptions of new ones. Several new species from some other genera that have already been revised are also described. With the present paper, the subfamily Chaetomalachiinae is now completely revised and no obscure taxa remain.

Abbreviations used

BMNH	British Museum, Natural History, London, U.K.
HNHM	Természettudományi Muzeum, Budapest, Hungary
KMBC	Karel Majer, private collection, Brno, Czech Republic
MNHN	Muséum National d' Histoire Naturelle, Paris, France
MRAC	Musée Royal de l' Afrique Centrale, Tervuren, Belgium

NHMB Naturhistorisches Museum Basel, Switzerland
RCSL Private collection of Dr. R. Constantin, Saint-Lô, France
ZMUM Zoologicheski Muzei MGU, Moscow, Russia
ZSMC Zoologische Staatssammlung, München, Germany

Classification of the genus *Dasytidius*

The genus *Dasytidius* comprises 74 species and subspecies until now, hence, they require an internal classification. Differences among the species group are not striking. They are primarily based on different transformation series (autapomorphic in themselves) of the tegmen and/or phallus (internal sac) which are correlated with biogeography. Superficial characters are mostly of convergent or parallel nature as is the rule in Chaetomalachiinae, a revisional key to species based on external characters seems therefore useless. After having reached the respective species group, both, female and male terminalia must be compared with illustrations found in the present paper and in the four previous papers (Majer 1989, 1990, 1991 a, b).

Key to the species groups

Figs 90, 91

1. Phallus more or less slender, apex neither strongly truncate nor claw-like incurved .... 2.
– Phallus robust, with strongly truncate apex and/or the latter is claw-like incurved. Mostly robust, shortly cylindrical species .... 7.

2. Tegmen with prebasal dilation. Base of phallus extensive, mostly subtriangular, distal half mostly more or less sinuate .... 3.
– Tegmen without prebasal dilation. Base of phallus less extensive, seldom subtriangular, distal half not sinuate .... 4.

3. Apex of phallus strongly sinuate. Seminal canal of ♀♀ slender, membranous. Distribution: Turkey, Syria, Lebanon .... 1. *fulvipes*-group
– Apex of phallus simply incurved. Seminal canal of ♀♀ always sclerotized. Distribution: Whole East Mediterranean .... 2. *syriacus*-group

4. Base of phallus very small, body nearly straight. Internal sac with one kind of straight very slender spinules only, these mostly arranged into a row. Tegmen distally strongly narrowed and conical. Distribution: West Mediterranean .... 4. *medius*-group
– Base of phallus more extensive, body more or less arched. Internal sac without spinules or with different ones. Tegmen distally less slender .... 5.

5. Base of phallus narrowly lobed, Internal sac unarmed or with one kind of spinules only. Distribution: Syria, Turkey, Greece .... 3. *optivus*-group
– Base of phallus less narrowly lobed but rather subtriangular. Not in East Mediterranean .... 6.

6. Tegmen distally somewhat less conical. Phallus always robust. Distribution: West Mediterranean .... 5. *vestitus*-group
– Tegmen distally mostly strongly conical. Distribution: Central Asia & East Palaearctic .... 6. *rufimanus*-group

7. Phallus robust, apex broadly truncate and/or finely incurved at tip. Distribution: Palaearctic .. 8.
– Phallus rather slender, not simply truncate at apex, tip strongly claw-like incurved. Distribution: Afrotropical .... 10.

8. Phallus strongly constricted in front of base, tip not incurved. Tegmen posteriorly with lateral dilation. Apex of spicular fork incurved. Distribution: Iran .... 7. *transversus*-group
– Phallus not constricted in front of base, tip incurved. Tegmen and spicular fork simple .... 9.

9. Internal sac with two kind of spinules only. Distribution: Whole East Mediterranean .... 8. *persicus*-group

– Internal sac with three kinds of spinules and one arched sclerite composed of more or less fused spinules. Distribution: The Balkans, Turkey & Cyprus .... 9. *indutus*-group

10. Bottom of tegmen simply convex. Internal sac with several big spines. Distribution: Somalian, Sudanic & West-African .... 10. *sudanicus*-group

– Bottom of tegmen strongly broadened and flat to emarginate. Internal sac without spinules or with fine numerous ones. Distribution: Somalian & East-African .... 11. *atrimembris*-group

Systematic survey of species

1. *fulvipes*-group

This is a well defined, small group, with appearance rather of *D. indutus* Kiesw., with sparse pilosity and light extremities. It could be also included in the *syriacus*-group.

1. *fulvipes* (Reitter, 1885); Syria, Turkey.
   Dasytiscus fulvipes Reitter, 1885: 242, 244.

2. *prosperus* Majer, 1989; Turkey.
   Majer, 1989: 141, 154; figs 2, 9, 10, 44, 59, 78.

3. *insularis*, spec. nov.; Greece (Lesvos).

2. *syriacus*-group

This large group is homogeneous due to the autapomorphic prebasal dilation of the tegmen.

4. *sparsepubens* Majer, 1990; Libya.
   Majer, 1990: 41, 53; figs 16, 34, 42, 43, 58, 76, 87.
   Dasytidius indutus var. *sparsepubens* Pic, 1925a: 2.

5. *ethologus* Majer, 1989; Greece (Crete).
   Majer, 1989: 145, 154; figs 17, 18, 33, 35, 42, 49, 64, 80.

6. *subsyriacus* Majer, 1991; Jordan, Syria.
   Majer, 1991a: 7; figs 9, 25, 38, 55, 65, 89.

7. *syriacus* (Reitter, 1885); Cyprus, Israel, Jordan, Lebanon, Syria, Turkey.
   Dasytiscus syriacus Reitter, 1885: 245.
   Dasytiscus syriacus var. *obscuripes* J. Sahlberg, 1913: 151.

8. *kalalovae* Majer, 1991; E Iran, Iraq, Turkey.
   Majer, 1991a: 3; figs 3-5, 24, 35, 49-52, 67, 68, 83, 84, 86.

9. *alfierii* (Wittmer, 1935); Iraq, Israel, Jordan, Syria, Sinai.
   Dasytiscus (Haplothrix) Alfierii Wittmer, 1935: 188.
   Dasytidius atratus Majer, 1991a: 2; figs 2, 23, 48, 69, 85.

10. *nigripes* (Pic, 1894); Azerbaidjan, Iran, Syria, Turkey.
   Dasytiscus nigripes Pic, 1894: 112.
   Dasytiscus indutus var. *obscuripes* Pic, 1896: 48.
   Dasytidius obscuripes Liberti, 1986: 188; figs 9-12.
   Dasytidius attenuatus Majer, 1991a: 7; figs 22, 39, 66, 90.
   Dasytidius svihlai Majer, 1991b: 6, 17; figs 8, 25, 36, 54, 87.

11. *inchoatus* Majer, 1991; Cyprus.
   Majer, 1991a: 5; figs 10, 36, 53, 87.

12. *aurescens* Majer, 1991; Syria.
Majer, 1991a: 4; figs 7, 35, 52, 86.

13. *latissimus* Majer, 1989; Syria, Turkey.
Majer, 1989: 16.
Dasytidius avius Majer, 1989: 149, 154; figs 23-25, 67-69, 83.

14. *maceki* Majer, 1991; Iraq.
Majer, 1991a: 9; figs 13, 27, 41, 57, 71, 91.

15. *laticollis* (Bourgeois, 1885); Iraq.
Dasytiscus laticollis Bourgeois, 1885: 256, 257.

3. *optivus*-group

The tegmen in this group lacks a prebasal dilation, but the phallus in several species (e.g. Nos. 19 & 20) strongly resembles that in the *syriacus*-group. The inclusion of *D. emgei* (Reitt.) is rather tentative, the latter might form a special species-group.

16. *optivus* Majer, 1989; Syria.
Majer, 1989: 143, 154; figs 15, 16, 37, 48, 63, 79.

17. *crassicornis*, spec. nov.; Syria.

18. *recticollis*, spec. nov.; Syria.

19. *congruens* Majer, 1989; Turkey, Sporades, Rhodos.
Majer, 1989: 143, 145; figs 13, 14, 47, 62, 77.

20. *brevicornis*, spec. nov.; Turkey.

21. *emgei* (Reitter, 1884); Greece.
Dasytiscus Emgei Reitter, 1884: 79.

4. *medius*-group

The uniform phallus, internal sac and female copulatory organs make this group the best definable one of all *Dasytidius*.

22. *petrowi* (Pic, 1923); Egypt, Libya.
Dasytiscus (Dasytidius) Petrowi Pic, 1923: 9.

23. *melitensis* (Bourgeois, 1885); Malta, Sicilia.
Dasytiscus melitensis Bourgeois, 1885: 256, 270.

24. *medius* (Rottenberger, 1871); Algeria, Tunisia, Morocco.
Dasytiscus medius Rottenberger, 1871: 244.
Dasytiscus obesus Kiesenwetter, 1871: 85 (note 1).
Dasytiscus pexus Kiesenwetter, 1871: 85.
Dasytiscus squamatus Kiesenwetter, 1871: 86.
Dasytiscus Beckeri Kiesenwetter, 1871: 86.
Dasytiscus Sedilloti Bourgeois, 1885: 256, 268; fig. 4.
Dasytiscus Theresae Pic, 1896: 48.

25. *normandi* Majer, 1990; Tunisia.
Majer, 1990: 40, 43; figs 3, 35, 49, 62.

26. *crenulatus* (Pic, 1925); Libya.
Danacaea crenulata Pic, 1925a: 3.
Dasytiscus convexus Pic, 1928: 103.

27. *diversimembris* (Pic, 1937); Algeria, Morocco.
Dasytiscus diversimembris Pic, 1937: 52.
Dasytiscus (Dasytidius) diversipes Pic, 1922: 30 (nec *Dasytiscus atrotibialis* var. *diversipes* Pic, 1917).

28. *constantini* Majer, 1990; Morocco.
Majer, 1990: 40, 46; figs 7, 32, 52, 66.

29. *otini* Majer, 1990; Morocco.
Majer, 1990: 40, 47; figs 8, 24, 37, 53, 67.

30. *deportatus* (Peyerimhoff, 1929); Algeria (Central Sahara).
Dasytiscus deportatus Peyerimhoff, 1929c: 194.

5. *vestitus*-group

This group is closely related to the *rufimanus*-group, particularly to the species 45-47, which are those the *rufimanus*-group is possibly derived from.

31. *vestitus* (Kiesenwetter, 1863); Algeria, Morocco, Tunisia.
Dasytiscus vestitus Kiesenwetter, 1863: 625 (Note 2).
Dasytiscus (*Dasytidius*) *vestitus* var. *Henoni* Pic, 1900: 88.

32. *bourgeoisi* (Schilsky, 1896); Spain (?), Morocco.
Dasytiscus (Dasytidius) Bourgeoisi Schilsky, 1896: No.72.

33. *pardoi* Majer, 1990; Morocco.
Majer, 1990: 40, 49; figs 11, 27, 38, 71, 83.

34. *gracilis* (Escalera, 1914); S Algeria, Morocco.
Dasytiscus gracilis Escalera, 1914: 246.

35. *syrticus* (Bourgeois, 1885); Sicilia, Tunisia.
Dasytiscus syrticus Bourgeois, 1885: 256, 266.
Dasytiscus (Dasytidius) neglectus Schilsky, 1897: No.84.

36. *wartmanni* (Reitter, 1897); Algeria.
Dasytiscus Wartmanni Reitter, 1897: 219.
Dasytiscus (Dasytidius) nigrofemoratus Schilsky, 1897: No.76.

37. *ragusai* (Procházka, 1895); Algeria, Libya, Sicilia, Tunisia.
Dasytiscus Ragusae Procházka, 1895: 139.
Dasytiscus (Dasytidius) Gestroi Schilsky, 1897: No.75.
Dasytiscus Ragusae Schilsky, 1900: No.2. [New species].

6. *rufimanus*-group

A very heterogeneous group at the first glance, but according to the sequence of the species below, some transformation series of both the tegmen and phallus are evident. Most genera of the Chaetomalachiinae occur in the Central Asian region. It is why the *rufimanus*-group may be the most ancestral one, possibly including predecessors of the other groups.

38. *ugamicus* Majer, 1991; Uzbekistan.
Majer, 1991b: 3, 19; figs 3, 34, 49, 50, 71, 85.

39. *sequensi* (Reitter, 1902); Armenia, Kazakhstan.
Dasytiscus (Haplothrix) Sequensi Reitter, 1902: 210.

40. *kubani* Majer, 1991; Armenia.
Majer, 1991b: 10, 17; figs 12, 92.

41. *rufimanus* (Bourgeois, 1885); Uzbekistan, Tajikistan.
Dasytiscus rufimanus Bourgeois, 1885: 256, 269.
Dasytiscus (Dasytidius) rufimanus var. *atripes* Schilsky, 1896: No.79.

42. *margelanus* Majer, 1991; Tajikistan.
Majer, 1991b: 5, 18; figs 7, 23, 38, 53, 70.

43. *hauseri* (Reitter, 1890); Uzbekistan.
Dasytidius Hauseri Reitter, 1890: 360.

44. *candidus* Majer, 1991; Afghanistan.
Majer, 1991b: 7, 18; figs 9, 37, 55, 73.

45. *marsaleki*, spec. nov.; Kirghizia.

46. *tajikistanus* Majer, 1991; Tajikistan.
Majer, 1991b: 9, 19; figs 11, 40, 57, 72, 91.

47. *turnai*, spec. nov.; China (Yunnan).

7. *transversus*-group

The two species classified here are closely allied and distinctly derived from the *persicus*-group.

48. *transversus* Majer, 1991; Iran.
Majer, 1991b: 14, 19; figs 15, 18, 44, 63, 80, 95.

49. *quaesitus* Majer, 1991; Iran.
Majer, 1991b: 15, 16; figs 19, 45, 64, 81.

8. *persicus*-group

It is placed near the *rufimanus*-group as some species interfere to the latter but they should be still recognizable by the more truncate apex of the phallus and two different kinds of spines in the internal sac.

50. *subnudus* Majer, 1991; Iraq, Israel, Jordan, Syria.
Majer, 1991a: 9; figs 14, 42, 58, 72, 93.

51. *infinitus* Majer, 1991; Syria, Turkey.
Majer, 1991a: 11; figs 16, 28, 44, 61, 81, 95.

52. *longiventris* Majer, 1991; Iran.
Majer, 1991b: 10, 19; figs 13, 41, 58, 74, 75, 93.

53. *persicus* (Pic, 1926); Iran.
Dasytiscus (Dasytidius) persicus Pic, 1926: 1.

54. *robustus* Majer, 1991; Iran.
Majer, 1991b: 12, 17; figs 16, 26, 43, 60, 79.

55. *opertus* Majer, 1991; Iran.
Majer, 1991b: 15, 17; figs 20, 96.

56. *princeps* Majer, 1991; Iran, Iraq.
Majer, 1991a: 14; figs 19-21, 30, 46, 60, 73, 74, 96.

57. *virescens* (Baudi, 1873); Cyprus.
Dasytiscus virescens Baudi, 1873: 319.

58. *quadricollis* (Schilsky, 1896); Iran.
Dasytiscus (Dasytidius) quadricollis Schilsky, 1896: Nos. 75, 34 L.

59. *funebris* Majer, 1989; Turkey.
Dasytidius funebris Majer, 1989: 153, 154; figs 29, 30, 73, 86, 87.

9. *indutus*-group

This Balkanic group with autapomorphic structure of the internal sac is well defined and distinctly derived from the *persicus*-group.

60. *indutus indutus* (Kiesenwetter, 1859); Greece (continental).
    Dasytiscus indutus Kiesenwetter, 1859: 173.

61. *indutus dalmatinus* Majer, 1989; Croatia.
    Majer, 1989: 152; fig 71.

62. *indutus aegaeicus* (Liberti, 1986); Greece (Crete, Aegeian Islands).
    Dasytiscus indutus aegaeicus Liberti, 1986: 188, figs 6-8.

63. *indutus similis* (Schilsky, 1896); Cyprus, Turkey.
    Dasytiscus (Dasytidius) similis Schilsky, 1896: No.77.

64. *malkini*, spec. nov.; Turkey.

65. *impar*, spec. nov.; Turkey.

10. *sudanicus*-group

It is a more ancestral group than the *atrimembris*-group as the phallus is more slender and tegmen is not dilated at base.

66. *muehlei*, spec. nov.; Yemen.

67. *sudanicus* (Pic, 1929); Sudan.
    Dasytiscus sudanicus Pic, 1929: 138.

68. *endroedyi*, spec. nov.; Ghana.

11. *atrimembris*-group

This group with mostly bulky species is derived from the *persicus*-group. *D. wittmeri* is the most primitive member from the transformation series of the tegmen where the base is not yet so dilated. It may be a connecting link to the *sudanicus*-group. Some species (e.g. Nos. 71, 73) have the most modified terminalia of the whole genus.

69. *wittmeri* Majer, 1991; Saudi Arabia.
    Majer, 1991a: 13; figs 18, 75.

70. *addilaensis* (Wittmer, 1979); Saudi Arabia, Yemen.
    Dasytiscus (Haplothrix) addilaensis Wittmer, 1979: 191.

71. *clarkei*, spec. nov.; Ethiopia.

72. *desaegeri* (Pic, 1954); Zaire.
    Dasytiscus De Saegeri Pic, 1954: 211.

73. *atrimembris* (Pic, 1925); Ethiopia.
    Dasytiscus atrimembris Pic, 1925b: 17.
    Dasytiscus Scotti Wittmer, 1954: 136.

12. incertae sedis

74. *licenti* (Pic, 1938); China.
    Dasytiscus Licenti Pic, 1938: 162.

Descriptions of new species

Dasytidius insularis, spec. nov.
Figs 1-4

Types. Holotype: ♂, "Lesvos-Greece Mytilini; 1959.VIII.2. Dr. Gozmány" (HNHM). - Paratypes: 26, same data (18 HNHM, 8 KMBC).

Differs from *D. fulvipes* in pubescence and male terminalia.

Upper surface without distinct metallic lustre (which is light-greenish in *D. fulvipes*), legs rufotestaceous, tarsi more or less infuscate, mouth parts and antennal scape black, segments 2-5 (often 2-8) rufotestaceous, then gradually darkened. Integument with very dense texture, semi-mat, pubescence greyish, long, almost dense, semi-villose (denser and longer than in *D. fulvipes*), with subseriately intermixed setae on elytra; pronotum with distinct marginal fringe.

Head with fine coriaceous texture, eyes moderately prominent; antenna short, segments 5-10 always strongly transverse, subserrate. Pronotum subarcuate at base, broadest across basal third, sides nearly straight and narrowing forwards, apex straight; upper surface with coriaceous texture, semi-mat, side margins with reduced irregular denticles; pubescence arranged towards a point near base; marginal fringe irregular, long. Elytra with dense and shallow, rather indistinct puncturation and transverse wrinkles; sutural angles scarcely rounded; marginal fringe more or less distinct.

♂. Length 2.3-2.5 mm, width 0.8-0.9 mm. Antennal joints less transverse; elytra parallelsided, subtruncate at apex, sutural angles slightly rounded respectively. Pygidium nearly 3 × wider than long, suboblong in outline; sternum VII nearly straight at apex, only weakly emarginate and impressed; VIII with median process forked at base (Fig. 1). Spicular fork with fine walls, spiculae subangulate, nearly as long as fork proper; tegmen very slender (Fig. 2); phallus in side view (Fig. 3) subsinuate at apex, tip briefly incurved; internal sac without distinct spinules.

♀. Length 3.0-3.2 mm, width 1.1-1.3 mm. Antennal joints more transverse; elytra broadening, more rounded at apex, sutural angles more rounded. Pygidium nearly semicircular, apex briefly incised. Sternum VII scarcely produced at apex; seminal canal long, membranous (Fig. 4).

Distribution. Greece: Aegean Islands (Lesvos).

Dasytidius inchoatus Majer, 1991
Fig. 5

This species was described from males only. I am giving here a picture of unusually shaped internal organs in a female specimen from Crete (Fig.5).

Dasytidius crassicornis, spec. nov.
Figs 6-9

Holotype: ♂, "Dr Lenthnur, Djebel Aevi, N. Syrien" (NHMB).

Small, slender species resembling *D. syriacus* Reitt. but antenna extremely robust.

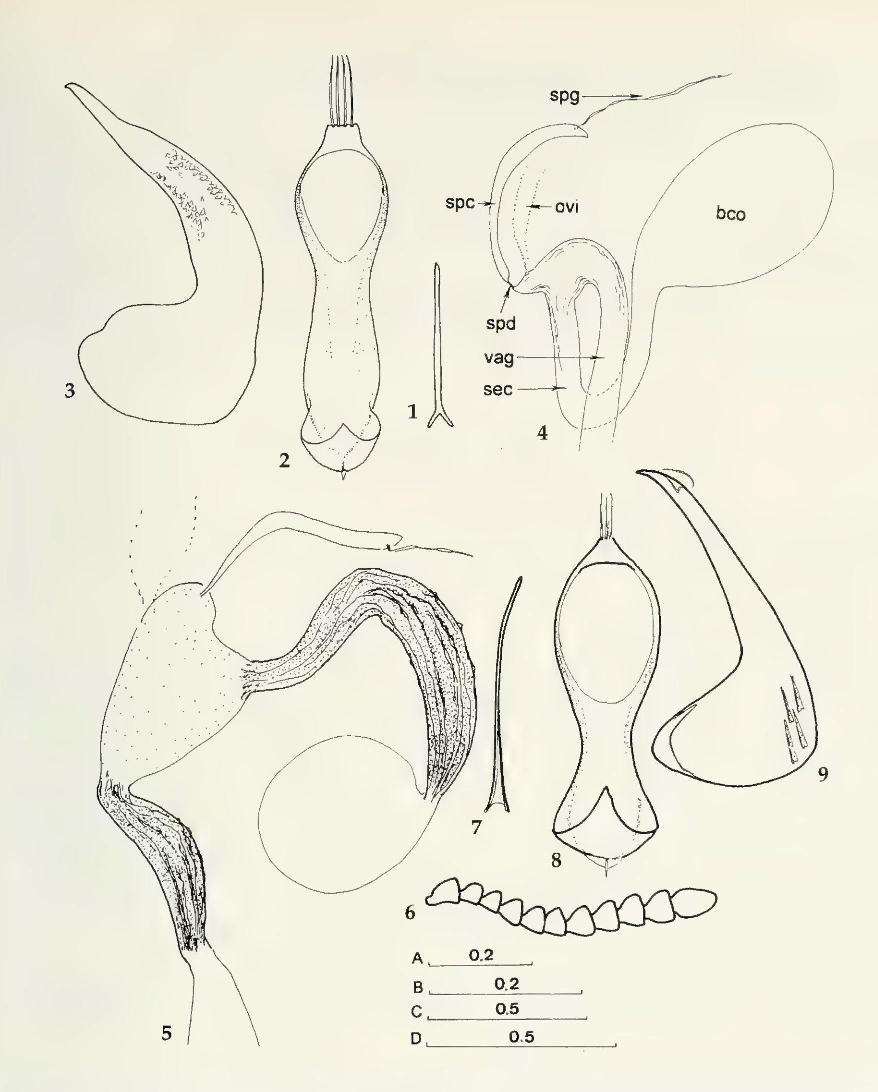
Coloration black, with metallic reflexes, extremities rufotestaceous, femora, scape, distal antennal half and mouthparts infuscate. Pubescence apparently dual, more and less decumbent hairs present, integument with very fine texture.

♂. Length 2.2 mm, width 0.7 mm. Head big with bulging eyes, head surface finely coriaceous; antenna long with robust segments, these mostly transverse (Fig. 6). Pronotum transverse, as wide as head and slightly narrower than elytra, base arcuate, sides nearly straight, disc polished, nearly impunctate, sides finely coriaceous, marginal denticles small and reduced, marginal bristles distinct. Elytra indistinctly bordered along side margins, puncturation indistinct, with fine, rather coriaceous, texture.

Pygidium nearly semicircular; sternum VII weakly tapered; VIII with process swollen at base (Fig. 7); spicular fork with fine walls, spiculae curved; tegmen slender (Fig. 8); phallus in side view (Fig. 9) with large base and very slender, incurved body, internal sac with 4 slender spinules.

♀. Unknown.

Distribution: Syria.



Figs 1-9. 1-4. *Dasytidius insularis*, spec. nov. (1-3. ♂ Holotype). 5. *D. inchoatus* Majer, ♀. 6-9. *D. crassicornis*, spec. nov., ♂ Holotype. 1, 7. Median process of sternum VIII. 2, 8. Tegmen ventral. 3, 9. Phallus ventral. 5. ♀ copulatory organs. 6. Antenna. bco: bursa copulatrix, ovi: oviduct, sec: seminal canal, spc: spermathecal capsule, spd: spermathecal duct, vag: vagina. Scales: A = Figs 1-3,5; B = 7-9; C = 4; D = 6.

Dasytidius recticollis, spec. nov.
Figs 10-14

Holotype: ♂, "Dr. F. Leuthner, Djebel Akrab, 85, N. SYRIEN" (KMBC).

Similar to *D. optivus* Majer but differs from all *Dasytidius* species by distinctively oblong pronotum and strongly transverse antennal segments.

Coloration black, upper surface lustrous, with greenish tinge, legs rufotestaceous (but the Holotype has preserved middle femora only), scape piceous, segments 2-3 rufotestaceous, 4-11 gradually dark-

ened, but bases of all segments pale. Upper surface indistinctly punctate, with fine and dense microsculpture, pubescence unicolorous, greyish, and dual.

♂ (Fig. 10). Length 2.6 mm, width 0.9 mm. Head with moderately prominent big eyes, surface with indicated puncturation, with dense rugosity and microsculpture, semi-mat; antennal segments 5-10 distinctively transverse. Pronotum transversely oblong, sides nearly straight, side margins regularly crenate; disc indistinctly punctate, texture somewhat rasp-like, intervals polished, pubescence as in other *Dasytidius* species; marginal fringe distinct. Elytra indistinctly bordered, apex subtruncate, sutural angles scarcely rounded, surface indistinctly punctate, finely and transversely wrinkled, with microsculpture; pubescence moderately dense, scarcely dual, more erect hairs not well defined.

Pygidium nearly trapeziform, sternum VII slightly tapered, apex lightened; VIII with median process forked at base (Fig. 11). Spicular fork with arched spiculae (Fig. 12), fork proper rather short; tegmen shown (Fig. 13); phallus in side view (Fig. 14) resembles that in *D. optivus* Majer.

Distribution: Syria.

Dasytidius brevicornis, spec. nov.

Figs 11-15

Types. Holotype: ♂, "Bergama (ancient Pergamon), 18-21.V.1981, B. Malkin" (RCSL, will be deposited in MNHN). - Paratypes: 8, same data (RCSL); 1, ditto, 16-17.VI.1979, B & H. Malkin (KMBC); 3, "Turkey, ancient Priene, 13.V.1979, B. Malkin" (1 KMBC, 2 RCSL).

Very closely allied to *D. congruens* Majer, differing in large size, completely black extremities, but chiefly in the structure of terminalia.

Upper surface with indistinct plumbeous lustre being well covered with greyish pubescence; extremities black, only tibia and tarsi sometimes more or less infuscate, antennal segments 2-3(-6) more or less infuscate to rufopiceous. Integument with fine, not very dense texture, partly lustrous, elytra more or less distinctly punctate; pubescence at first sight single but more erect hairs mostly intermixed (in *D. congruens* such hairs lack and thus it seems to belong in *Haplothrix*).

Head with large, well prominent eyes (in both sexes), surface with fine coriaceous texture but almost lustrous; antenna very short, with transverse terminal segments. Pronotum strongly transverse, base and sides arcuate, apex straight, side margins very finely bordered, marginal denticles strongly reduced, disc with texture often sparser than on head, pubescence arranged towards an arched prebasal line and a point close to base; marginal fringe distinct. Elytra distinctly, very densely and shallowly punctate, punctures forming transverse wrinkles; pubescence dense, fine, semi-villose; suberect subseriate hairs distinct to imperceptible; marginal fringe scarcely distinct as overlapped by suberect hairs and strong convexity of elytra; sutural angles more or less rounded.

♂ (Fig. 11). Length 2.8-3.3 mm, width 0.9-1.1 mm. Antennal segments more robust and less transverse, elytra evenly convex. Pygidium roundly trapeziform, apex arcuate; sternum VII briefly produced at apex, VIII with moderately long median process swollen at base (Fig. 12); tegmen and phallus (Figs 13, 14) similar to those in *D. syriacus* Reitt; internal sac with 6-7 larger spinules.

♀. Length 2.8-3.4, width 1.0-1.2 mm. Antennal segments finer and more transverse, elytra widening and more convex posteriorly. Pygidium with strongly converging sides, apex arcuate and briefly emarginate; apex of sternum VII weakly tapered, seminal canal well sclerotized (Fig. 15).

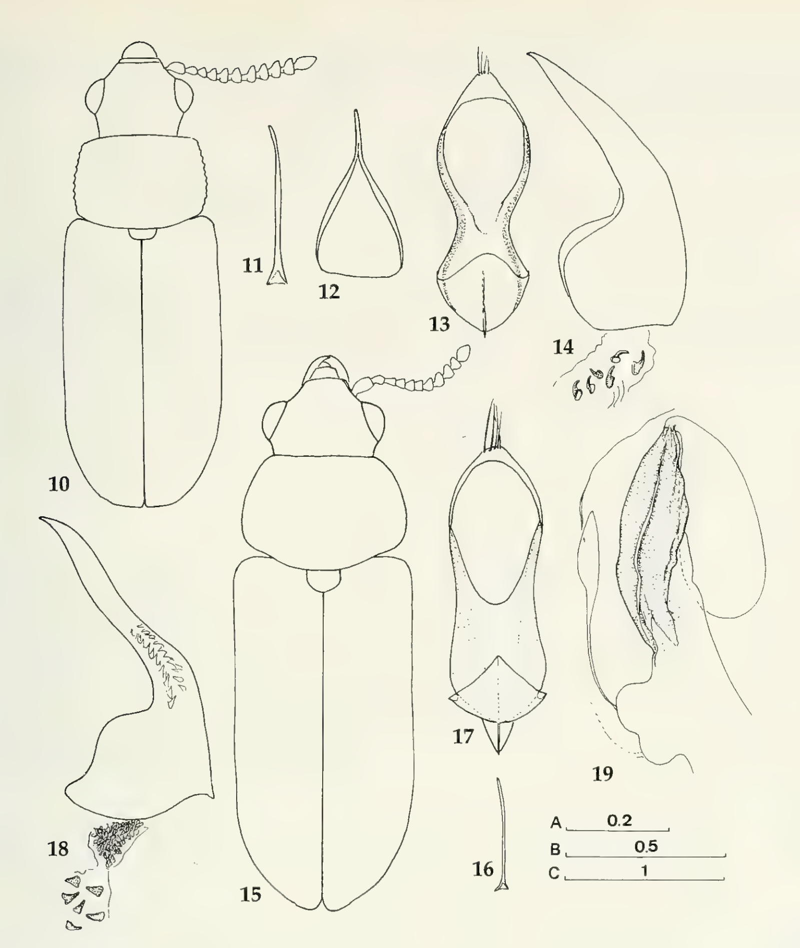
Distribution: Turkey.

Dasytidius marsaleki, spec. nov.

Figs 20-24

Types. Holotype: ♂, "USSR, Kirghizia, 16.7.88, Sary-Chelek reserv. (SW of Kara-kul), V.Kubáň leg." (ZSMC). - Paratypes: 1♀ (ZSMC), 84 (KMBC).

Related to *D. tajikistanus* Majer from which it is easily distinguished in the combination of deep violaceous to bronze lustre, conical pronotum, rufotestaceous tibiae and tarsi and short, suberect, fuscous pubescence.



Figs 10-19. 10-14. *Dasytidius recticollis*, spec. nov., ♂ Holotype. 15-19. *D. brevicornis*, spec. nov. (15-18. ♂ Holotype). 10, 15. Body outline. 11, 16. Median process of sternum VIII. 12. Spicular fork. 13, 17. Tegmen ventral. 14, 18. Phallus lateral. 19. ♀ copulatory organs. Scales: A: Figs 11, 13, 14, 17, 18; B: 12, 16, 19; C: 10, 15.

Black, with deep violaceous-bronze lustre; knees, tibiae, tarsi, antennal segments 2-3(-4) rufotestaceous, basal portion of femora more or less infuscate. Integument very finely and densely punctate, pubescence very short, suberect, fuscous.

Head with fine, moderately dense punctures; antennal segments fine, 4-10 subtriangular, 11 nearly as long as 9 and 10 together. Pronotum transverse, conical, base arcuate, sides straight, disc as punctate as head, sides coriaceous, perimeter very finely bordered; side margins with regular small denticles, each bearing short black seta, forming together marginal fringe. Elytra very finely, inconspicuously punctured, rather transversely wrinkled, pubescence longer and thicker than that on pronotum, marginal fringe not well defined, side margins very finely bordered, apex slightly explanate, sutural angles slightly rounded respectively.

♂. Length 2.6-3.2 mm, width 1.0-1.1 mm. Pronotum narrower, extremities longer and thicker. Pygidium subtrapeziform; sternum VII with subarcuate apex; VIII with long median process (Fig. 20); spicular fork slender (Fig 21); tegmen shown, (Fig. 22); phallus in side view robust (Fig. 23), internal sac with two rows of spinules diminishing distad.

♀. Length 3.1-3.7 mm, width 1.3-1.5 mm. Pronotum wider, extremities shorter and more slender. Pygidium trapeziform, apex shallowly incised; hind margin of sternum VII straight; spermathecal canal sclerotized (Fig. 24).

Distribution: Kyrgyzstan.

Dasytidius deportatus (Peyerimhoff) comb. nov.

Figs 25-29

Dasytiscus deportatus Peyerimhoff, 1929: 194.

Types. Lectotype: ♀, "Haut Oued In Dalay Hoggar, v. 2250 m, 21 mars 1928, fl. d' *Euphorbia*... [illegible]" (Peyerimhoff's MS); "MISSION DU HOGGAR FÉVRIER-MAI 1928" (printed, white label with black margin); "*Dasytiscus deportatus* Peyerimhoff types ♂, ♀" (olivaceous label, Peyerimhoff's MS) (MNHN). - Paralectotype: 1♀, same data (MNHN).

Isolated species, whose relation to the *medius*-group is not quite clear but its shape makes it near to *D. convexus* Pic etc.

Weakly sclerotized. Black, upper surface with olivaceous-bronze lustre, extremities mostly dark-brown but never black; integument not punctured, with very dense texture only, weakly lustrous; pubescence dense, dual and bicolorous.

♂. Unknown.

♀ (Fig. 25). Length 2.9-3.3 mm, width 1.0-1.3 mm. Eyes not prominent, head surface with dense, scabrose and granular texture, antennal segments 6-10 (Fig. 26) submoniliform. Pronotum weakly transverse, base subarcuate, sides arcuate, apex straight; texture as dense as on head; side margins scarcely crenate, lateral fringe fine; pubescence of surface pointing from sides towards middle; converging point not clear. Elytra broadly rounded respectively at apex, humerus not very prominent, side margins finely bordered; surface with fine dense texture having no distinct punctures but rather transverse wrinkles, intervals among them with coarse microsculpture, pubescence dual and bicolorous: (a) whitish suberect hairs shorter than (b) dark, hirsute longer and thicker bristles, the latter not subseriately admixed but are as dense as the whitish ones; lateral fringe distinct at hind elytral portion. Membranous wings abbreviate, neither functional nor foldable, nervature reduced, bearing no essential *Dasytidius* characters (Fig. 27).

Pygidium (Fig. 28) rather semicircular; hind margin of sternum VII nearly semicircular, apex weakly emarginate; seminal duct (Fig. 29) not sclerotized but its structure comports with that in many *Dasytidius* species.

Distribution: S Algeria (Hoggar).

Remarks. Peyerimhoff supposed the two specimens to be a male and female (there is some difference in the body outline). They were originally mounted onto a common card but are separated now. The abbreviate membranous wings have no analogy in the Dasytidae known to me.

Dasytidius sudanicus (Pic), comb. nov.

Figs 30-33

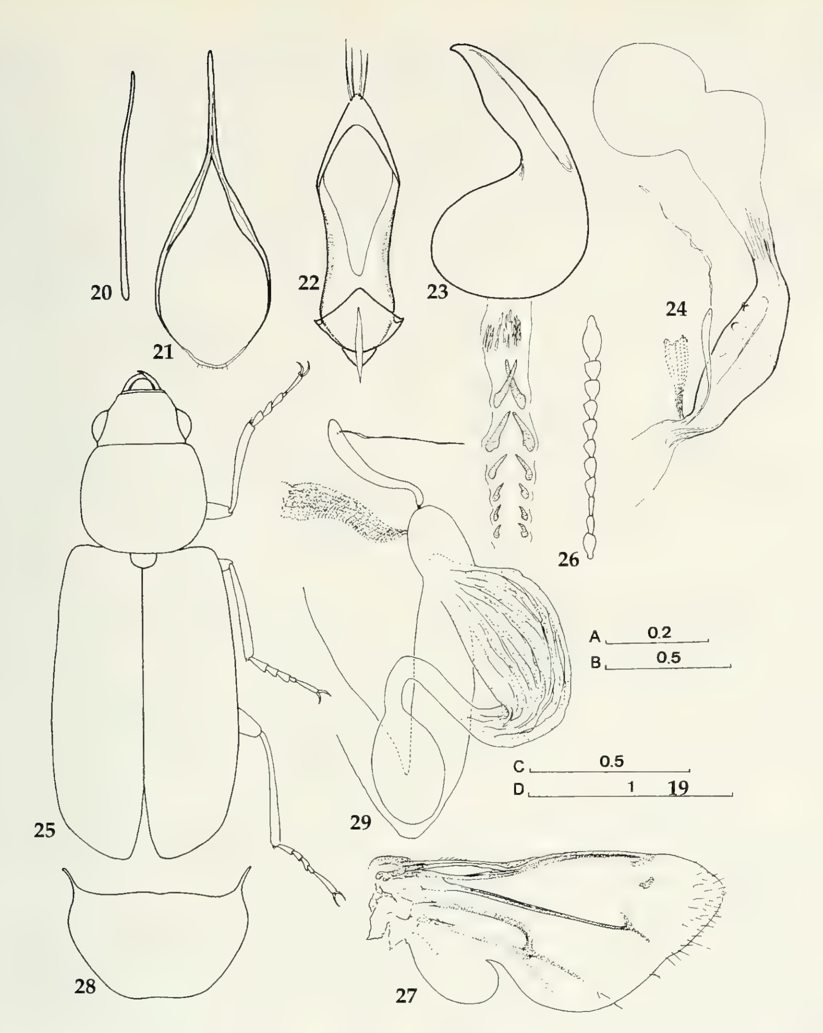
Dasytiscus sudanicus Pic, 1929: 138.

Types. Lectotype: ♂, "Sudan Govt." (printed); "GRF Medani H. W. Bedford, 15.10. 26, on cotton" (handwritten); "WTRL Ent. Col. C. 364" (white label, black margin); "*Dasytiscus sudanicus* n. sp." (Pic's MS); "gardé 1" (Pic's MS); "type" (circular with red margin) (BMNH). - Paralectotype: 1♀, labelled as Lectotype but "6.10.26 on Ads", and, "un ou Br. Museum de forme plus allongée" (Pic's MS) (MNHN).

Species of rather isolated position nevertheless belonging close to *D. endroedyi*, spec. nov.

Sexes unlike. Coloration brown to piceous, legs completely and antenna partly (segments 2 and 3) testaceous. Integument with very fine texture, semi-mat; vestiture whitish, fine, short and even, nearly decumbent, somewhat more erect hairs may be found along elytral sides; lateral fringe distinct on pronotum only.

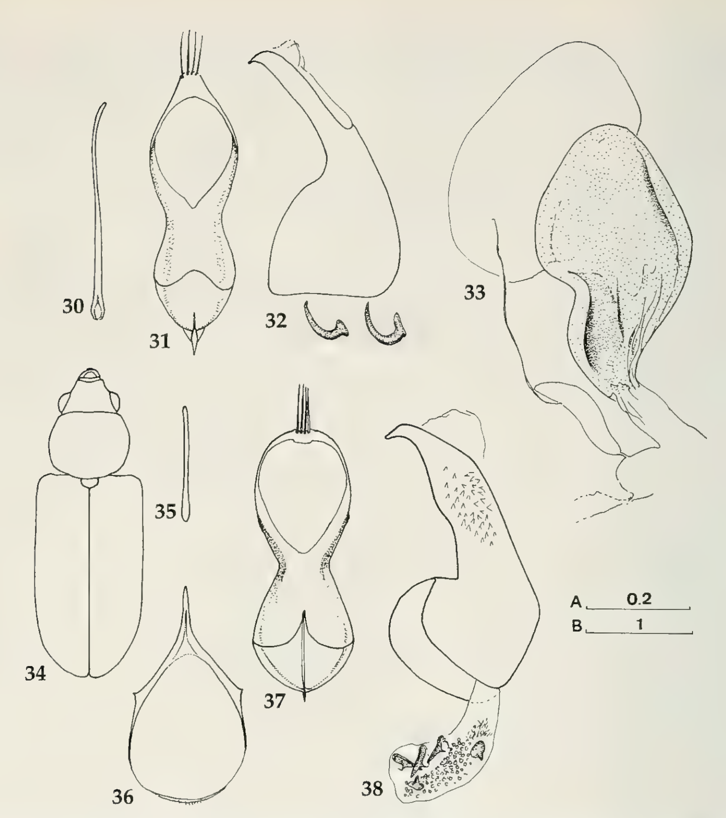
Head with moderately prominent eyes, head surface with fine puncturation, nearly polished. Pronotum transverse, broadest at basal third, base and apex nearly straight, sides slightly converging



Figs 20-27. 20-24. *Dasytidius marsaleki*, spec. nov. (20-23. ♂ Holotype). 25-27. *D. deportatus* Peyerimhoff, ♀ Lectotype. 20. Median process of sternum VIII. 21. Spicular fork. 22. Tegmen ventral. 23. Phallus lateral. 24, 29. Internal copulatory organs. 25. Body outline. 26. Antenna. 27. Wing. 28. Pygidium (all setae omitted). Scales: A: Figs 20-23; B: 26, 27; C: 28, 29; D: 24, 25.

anteriorly; disc with very fine and moderately dense punctures, intervals with indistinct texture, rather lustrous; pubescence arranged towards a point near base; lateral fringe distinct. Elytral suture bordered along distal half, apex subtruncate, apices rounded respectively; upper surface with indistinct fine punctures and transverse wrinkles, intervals with distinct microsculpture.

♂. Length 2.3 mm, width 0.8 mm. Eyes more prominent. Antenna longer, segments thicker, 5-10 submoniliform. Pronotum less transverse, distinctly narrower than elytra, sides more arcuate. Elytral apex more rounded. Pygidium nearly semicircular to weakly trapeziform; sternum VII subarcuate; VIII with long and slender median process (Fig. 30); spicular fork with thick walls and incurved apex of fork proper; tegmen (Fig. 31) constricted across middle, its both base and apex subovate; phallus in side view (Fig. 32) with two large, slender, spines.



Figs 30-38. 30-33. *Dasytidius sudanicus* (Pic) (30-32. ♂ Lectotype). 33-38. *D. muehlei*, spec. nov., ♂ Holotype. 30, 35. Median process of sternum VIII. 31, 37. Tegmen ventral. 32, 38. Phallus lateral. 33. ♀ copulatory organs. 34. Body outline. 36. Spicular fork. Scales: A: Figs 30-33, 35-38; B: 34.

♀. Length 2.6 mm, width 1.0 mm. Eyes less prominent. Antenna shorter, segments 8-10 more or less transverse, almost narrower than elytra, sides less arcuate. Elytral apex more attenuate. Pygidium nearly semicircular, apex weakly emarginate; sternum VII scarcely produced in middle; seminal canal (Fig. 33) sclerotized, with two peculiar formations.

Distribution: Sudan.

Dasytidius muehlei, spec. nov.

Figs 34-38

Types. Holotype: ♂, "YEMEN/ Sana'a, Wadi Dor, 31.5.1978, leg. H. Mühle" (RCSL, will be deposited in MNHN).

Very closely allied to *D. wittmeri* Majer differing in dark legs and greyish pubescence.

Black, upper surface with dark metallic lustre, tibiae and tarsi rufopiceous. Integument with very dense texture, semi-mat, pubescence nearly single, very fine and short, moderately dense, greyish hairs subdecumbent, indistinctly intermixed with suberect ones on elytra.

♂ (Fig. 34). Length 2.9 mm, width 1.0 mm. Head with big, prominent eyes, head surface with irregular coriaceous sculpture, antennal segments 4-10 distinctly serrate and more or less transverse, 6 and 8 not distinctly smaller than adjoining. Pronotum distinctly narrower than elytra at base, base and sides

arcuate, apex straight, disc with texture as on head, side margins finely denticulate, marginal fringe weakly defined; surface with pubescence arranged towards a point close to base. Elytra strongly convex, with shallow and dense but indistinct punctures forming transverse wrinkles, intervals with microsculpture; side margins finely bordered, bordering visible along apical elytral third only as two anterior thirds are very strongly convex ; apex subtruncate, sutural angles weakly obtuse.

Pygidium trapeziform, apex emarginate; sternum VII with arcuate hind margin, VIII with very short simple median process (Fig. 35); spicular fork with angled spiculae (Fig. 36), fork proper very short; tegmen (Fig. 37) with round both base and apex, the latter briefly emarginate; phallus (Fig. 38) with beak- shaped apex; internal sac with several large spinules.

♀. Unknown.

Distribution: Yemen.

Dasytidius endroedyi, spec. nov.
Figs 39-44

Types. Holotype: ♂, "Ghana: Northern region, Savelugu, 30 km N of Tamale, Dr. S. Endrödy-Younga; Nr 438, netted, 26.X.1970" (HNHM). - Paratypes: 1, with data as holotype (KMBC); 1, "Ghana: Upper region, Tumu, N 10° 108', W 2°100', Dr. S. Endrödy-Younga; Nr 487, netted, 27.X.1971" (HNHM); 1, "Musée du Congo, Kiambi, 4.V.1931, G.F. de Witte"; "R.DÉT. S 3115" (MRAC).

Species with bulging eyes, constricted head and small transverse pronotum, closely allied to *D. sudanicus* Pic.

Piceous to black, upper surface semi-mat, with indistinct metallic reflexes, extremities testaceous to fuscous; mouthparts (excepting lightened apex of terminal maxillary segment), antennal scape and apical half darkened, tarsi and femora sometimes more or less infuscate. Integument with nearly single light pubescence, which is composed of fine, not dense and more or less decumbent hairs.

Head nearly impunctate, with coriaceous texture only; eyes bulging, head constricted beyond them, antennal segments 5-10 transverse. Pronotum small, strongly transverse, base arcuate, sides more or less converging anteriorly, upper surface with coriaceous texture as head or disc more glabrous and surface coriaceous at sides only; pubescence as in *D. sudanicus*, marginal denticles small but distinct, each bearing longer seta. Elytra finely bordered along side margins, tips rounded respectively, upper surface with more or less defined shallow punctures.

♂ (Fig. 39). Length 2.3-2.4 mm, width 0.8 mm. Slender, antennal segments 4-6 strongly transverse, situated obliquely to antennal axis. Pronotum smaller and more transverse. Extremities long and stout. Pygidium nearly semicircular; sternum VII scarcely emarginate and somewhat impressed at apex; VIII divided into two, median process slender and short (Fig. 40); spicular fork (Fig. 41) with fine walls; tegmen (Fig. 42) slender, resembling that in *D. sudanicus*; phallus in side view (Fig. 43) arched, with incurved tip; internal sac with one large spine.

♀. Length 2.9 mm, width 1.0 mm. Wider, antennal segments 4-6 not very different from neighbouring, pronotum bigger, less transverse, sides arcuate. Extremities more slender, shorter. Pygidium triangular, apex rounded; sternum VII briefly produced; seminal canal (Fig. 44) weakly sclerotized, fluently passing into bursa copulatrix, the latter well defined.

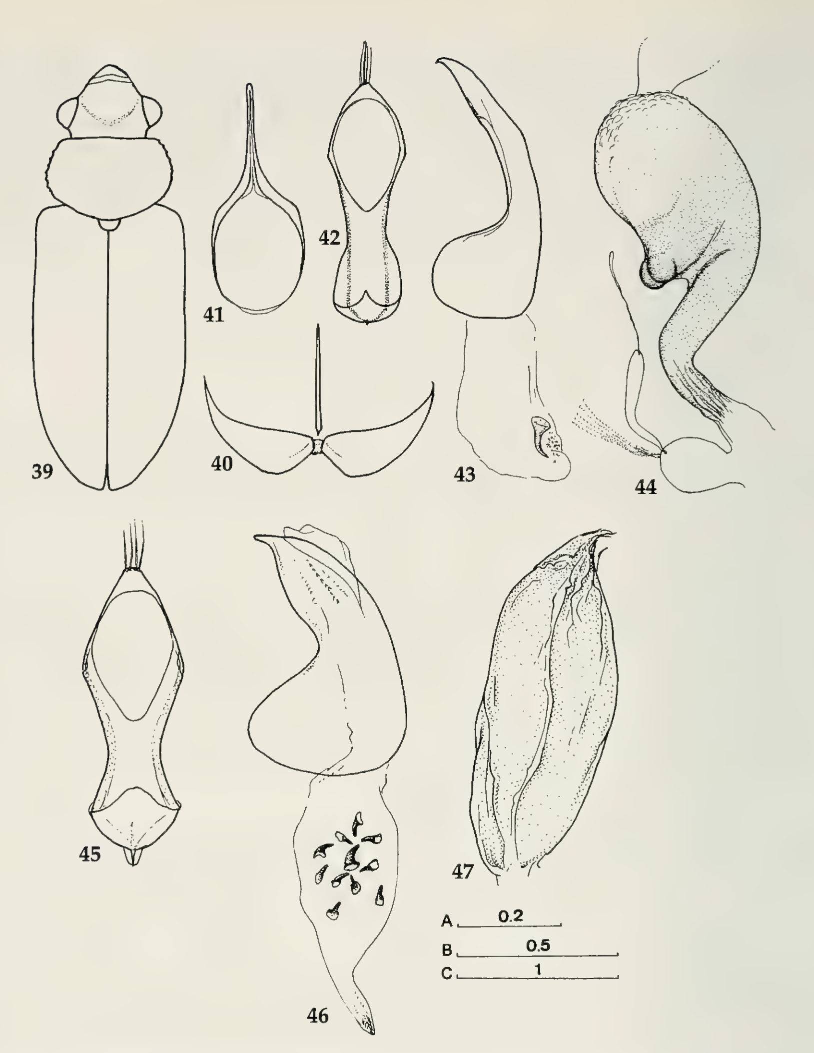
Distribution: Ghana.

Dasytidius turnai, spec. nov.
Figs 45-47

Types. Holotype, ♂, "China, Shaanxi 1992 120 km E Xi an Hua Shan, 3.-4. VI. Jaroslav Turna leg." (KMBC). - Paratypes: 4♂♂, 3♀♀, same data (KMBC).

Species of rather isolated position, most closely related to *D. tajikistanus* Majer but the strongly transverse pronotum is much narrower than elytra, antennal segments are not transverse.

Black, shiny, with weak aeneous lustre, head and pronotum rather finely coriaceous. Pubescence white, subdecumbent, rather sparse, pronotum and elytra with irregular sparse lateral fringe. Extremities rufotestaceous, antennal scape and segments 3(5) onwards darkened. Antenna approximately twice longer than pronotum, segments 2-3 and 11 elongate, 4-10 never distinctly transverse, 8 indistinctly



Figs 39-47. 39-44. *Dasytidius endroedyi*, spec. nov. (39-43. ♂ Holotype). 45-47. *D. turnai*, spec. nov. (45, 46. ♂ Holotype). 39. Body outline. 40. Sternum VIII. 41. Spicular fork. 42, 45. Tegmen ventral. 43, 46. Phallus lateral. 44, 47. ♀ copulatory organs. Scales: A: Figs 40-43, 45-47; B: 44; C: 39.

smaller than neighbouring. Head with moderately prominent eyes. Pronotum distinctly narrower than elytra across humeri, about one sixth broader than long, base arcuate, sides subconical, apex straight, hairs converging in middle near base. Elytra jointly rounded at apex, sutural angles more or less rounded respectively.

♂. Length 3.0-3.3 mm, width 1.0-1.2 mm. Parallel-sided. Antenna longer, segments weakly elongate, sutural angles weakly prominent. Pygidium about one third broader than long, weakly emarginate. Sternum VII almost straight, VIII with filiform median projection which is one third shorter than width of sternum proper. Spicular fork fine; tegmen (Fig. 45) resembles that in *D. indutus*; phallus in side view (Fig. 46) robust, with claw-like apex; internal sac with 10-12 spinules.

♀. Broadening posteriorly. Antenna shorter, segments not elongate, sutural angles more rounded.

Pygidium almost semicircular. Sternum VII straight, VIII narrowly crescent, seminal canal sclerotized, ovate in outline (Fig. 47).

Distribution: China (Yunnan).

Dasytidius malkini, spec. nov.
Figs 48-54

Types. Holotype: ♂, "TURKEY; ancient MYRA, (Antalya prov.), 8.V.1981, B. Malkin" (RCSL, will be deposited in MNHN). - Paratypes: 3♀♀, same data (2 RCSL, 1 KMBC).

Very near to *D. indutus* Kiesw. but pronotum extraordinarily transverse.

Upper surface scarcely with greenish lustre, legs and antennal segments 2-3(-5) rufescent. Integument with very fine texture, impunctate, dull; pubescence yellowish, semi-villose, long, dense, clearly dual on elytra; marginal fringe poorly marked on pronotum, not distinctive (but very long) on elytra.

Head with coriaceous texture but weakly lustrous, eyes moderately prominent; antenna with subserrate segments, penultimate ones always transverse. Pronotum strongly convex, extraordinarily transverse, base arcuate, hind corners completely rounded, apex straight; upper surface as on head; marginal denticles very dense and regular; lateral fringe long and striking; pubescence semi-erect at sides, arranged towards a point very close to base. Elytra impunctate, with shallow dense, transverse wrinkles and microsculpture, semi-villose pubescence consists of more and less decumbent hairs, the latter subseriately intermixed, marginal fringe not well different from surface pubescence but visible, very long; tips jointly rounded, sutural angles slightly rounded.

♂ (Fig. 48). Length 3.6 mm, width 1.3 mm. Antennal segments transverse from 4. Pronotum very broadly subtrapeziform, sides straight. Pygidium trapeziform, apex subarcuate; sternum VII subarcuate at hind margin, VIII with very long and simple median process (Fig. 49); spicular fork guttiform in outline (Fig. 50); tegmen as in *D. indutus*, tip briefly emarginate (Fig. 51); phallus in side view very robust (Fig. 52); internal sac with very complex structure.

♀. Length 3.7 mm, width 1.3 mm. Antennal joints transverse from 5. Pronotum strongly rounded at sides. Pygidium nearly semicircular; sternum VII briefly produced; seminal canal (Figs 53- 54) with distinctive structure.

Distribution: Turkey.

Dasytidius impar, spec. nov.
Figs 55-59

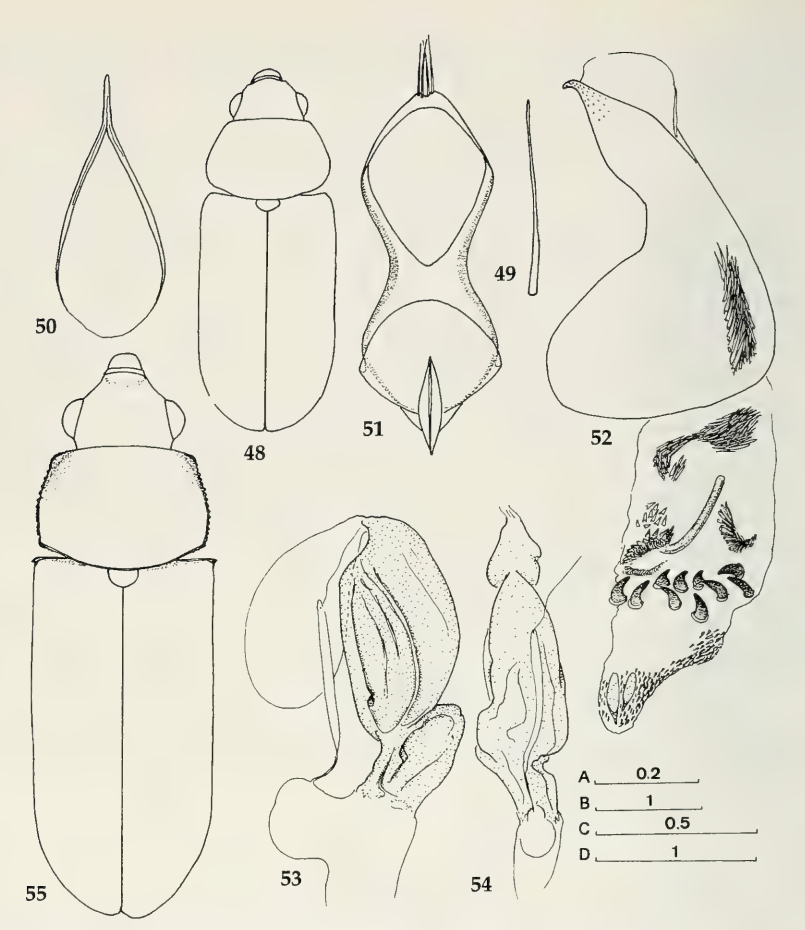
Types. Holotype:♂, "TURKEY: Alanya, 24.V.1979, B. Malkin" (RCSL, will be deposited in MNHN). - Paratypes: 15, same data (3 KMBC, 12 RCSL).

Species belonging in the *D. indutus*-group, especially to *D. funebris* Majer but habitually most resembling *D. virescens* Baudi in suboblong shape of pronotum and toothed humeri.

Black, upper surface with feeble plumbeous lustre but coloration is partly formed by dense greyish pubescence; extremities completely black, tibiae and tarsi seldom rufescent. Integument with dense and fine coriaceous texture, semi-mat; pubescence greyish to yellowish, semi-villose, clearly dual overall body upper surface.

Head with coriaceous texture, mat, eyes more or less prominent, antennal segments 4(5)-10 subserrate, transverse, 6 and 8 not distinctly smaller than adjoining. Pronotum transverse, slightly constricted preapically, suboblong, base subarcuate, sides more or less subangulate, both anterior and posterior corners pronounced; base and sides bordered, side margins with small irregular denticles, marginal fringe prominent; pronotal surface with coriaceous texture, being mostly finer on head, pronotum therefore somewhat more lustrous, surface with pubescence arranged towards a longitudinal median line and point at base. Elytral base edged at anterior corners, humeri with sharp denticle each; sutural angles more or less rounded; upper surface with flat transverse texture, scarcely punctate; pubescence clearly dual, semi- erect hairs admixed, marginal fringe almost overlapped by semi-erect hairs.

♂ (Fig. 55). Length 3.2-3.5 mm, width 1.1 mm. Antennal segments thicker. Elytra evenly convex and parallel-sided. Pygidium semicircular, very briefly incised; sternum VII briefly tapered, VIII with slender



Figs 48-55. 48-54. *Dasytidius malkini*, spec. nov. (48-52. ♂ Holotype). 55. *D. impar*, spec. nov., ♂ Holotype. 48, 55. Body outline. 49. Median process of sternum VIII. 50. Spicular fork. 51. Tegmen ventral. 52. Phallus lateral. 53. ♀ copulatory organs. 54. Same, different aspect. Scales: A: Figs 51, 52. B: 48; C: 49, 50, 53, 54; D: 55.

and simple median process (Fig. 56); spicular fork shown (Fig. 57); tegmen, as in other members of the *indutus*-group; phallus in side view (Fig. 58) with beak- shaped apex; internal sac with complex structure.

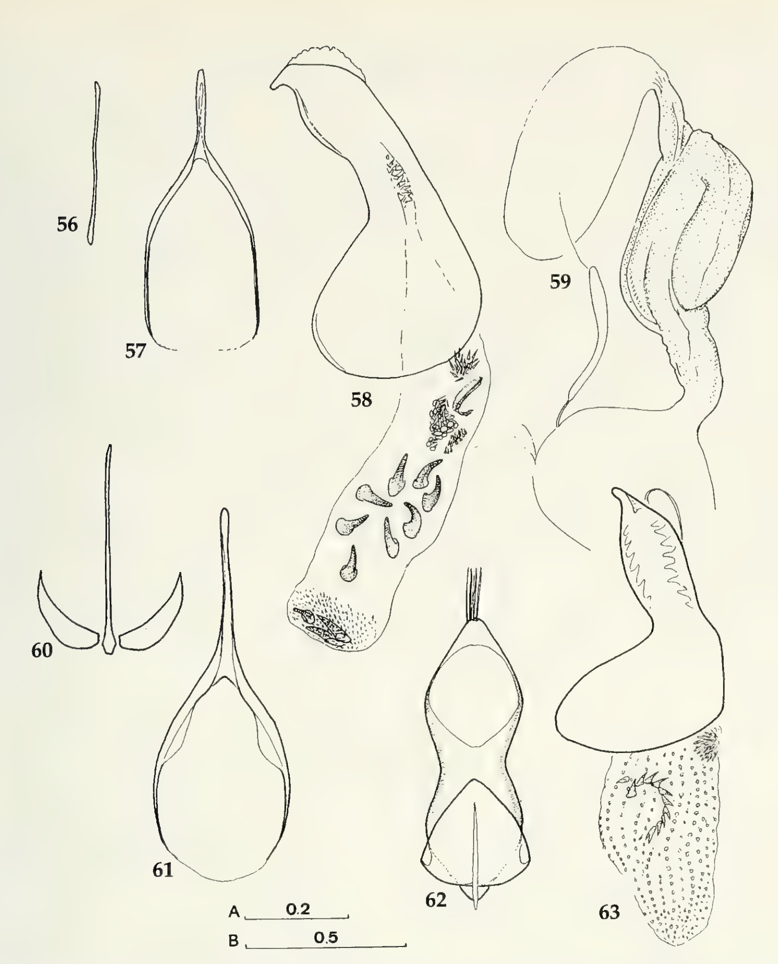
♀. Length 3.0-3.5 mm, width 1.1-1.3 mm. Antennal segments smaller, elytra somewhat broadening and more convex posteriorly. Pygidium subtrapeziform, apex weakly emarginate; sternum VII briefly produced; seminal duct heavily sclerotized (Fig. 59).

Distribution. Turkey.

Dasytidius wittmeri Majer, 1991
Figs 60-63

This species was described according to females only. I am giving here illustrations of the male terminalia (Figs 60-63).

Additional material: 2, Saudi Arabia, Thanomah, 1950 m, 11.4.1980, W. Büttiker" (1 KMBC, 1 NHMB).



Figs 56-63. 56-59. *Dasytidius impar*, spec. nov. (56-58. ♂ Holotype). 60-63. *Dasytidius wittmeri* Majer, ♂. 56. Median process of sternum VIII. 57, 61. Spicular fork. 58, 63. Phallus lateral. 59. ♀ copulatory organs. 60. Sternum VIII (all setae omitted). 62. Tegmen ventral. Scales: A: Figs 56-58, 61-63; B: 59, 60.

Dasytidius addilaensis Wittmer

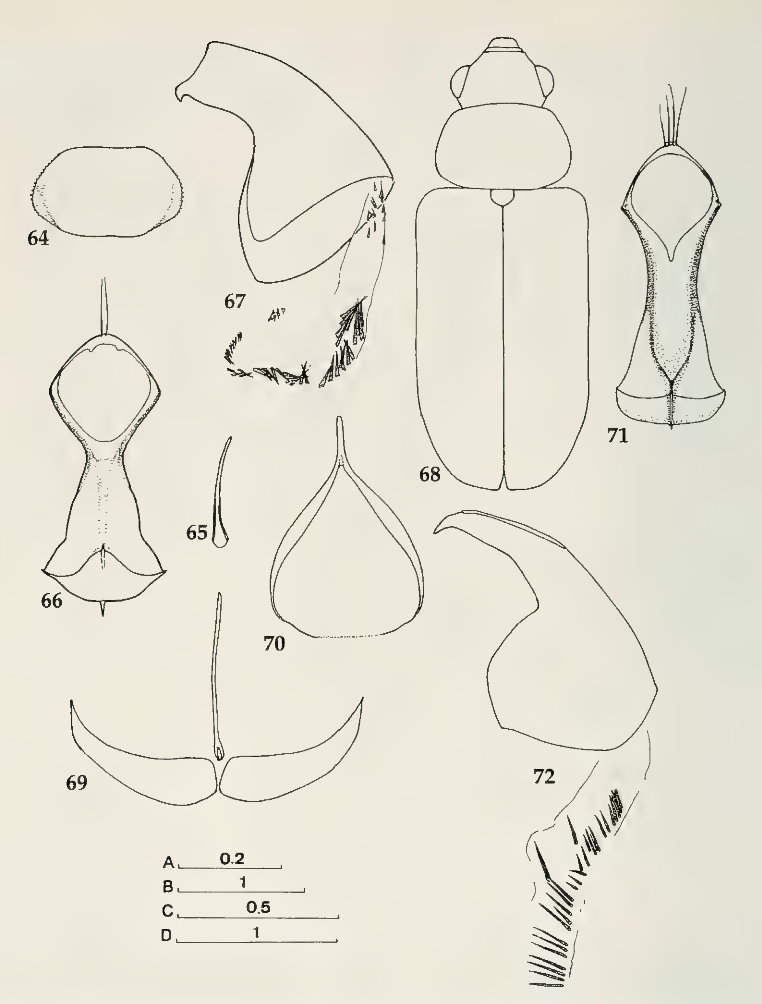
New for Yemen: 1♂, 1♀, Yemen, Horaz, Monacha-Mawsana, 3.6.1987, H. Mühle leg. (KMBC, RCSL).

Dasytidius clarkei, spec. nov.
Figs 64-67

Types. Holotype: ♂, "Sidamo Prov.: 105 km E of Neghelli, 1300/1500 m,7/8-V-74" (printed); "Coll. Mus. Tervuren Ethiopie, R.O.S. Clarke" (printed); "*Dasytiscus* sp. J. Decelle det. 1979" (MRAC).

Very closely resembling *D. addilaensis* in the body shape and terminalia, but pronotum is more transverse, with more rounded sides with distinctly denticulate side margins.

♂. Length 3.5 mm, width 1.4 mm. Robust, subcylindrical, strongly convex. Black, with plumbeous



Figs 64-72. 64-67. *Dasytidius clarkei*, spec. nov., ♂ Holotype. 68-72. *D. desaegeri* (Pic), ♂ Lectotype. 64. Outline of pronotum. 65. Median process of sternum VIII. 66, 71. Tegmen ventral. 67, 72. Phallus lateral. 68. Body outline. 69. Sternum VIII (all setae omitted). 70. Spicular fork. Scales: A: Figs 69-72; B: 64-66; C: 67; D: 68.

lustre, extremities rufotestaceous; antennal scape black, segments 5-11 gradually darkening, mouthpars black; apex of metatarsi and claws darkened. Integument indistinctly punctate, with somewhat coriaceous texture; pubescence flavescent, seemingly single, but a part of elytral hairs more reclinate.

Antennal segments 5 and 6 subtriangular, 7-10 distinctly transverse, 11 shortly subelliptical; head capsule as in *D. addilaensis*. Pronotum (Fig. 64) nearly twice as broad as long, sides strongly rounded and slightly explanate; side margins finely, but distinctly denticulate, fringe distinct; pubescence arranged towards a point at base. Elytra subtruncate at apex.

Pygidium, sternum VII, VIII (Fig. 65), and spicular fork nearly as in *D. addilaensis* Wittm; tegmen (Fig. 66) with more strongly broadening base, strongly constricted across middle; phallus (Fig. 67) slightly emarginate at apex, spinules somewhat less numerous than in *C. addilaensis*.

♀. Unknown.

Distribution: Ethiopia.

Dasytidius desaegeri (Pic), comb. nov.
Figs 68-72

Dasytiscus Desaegeri Pic, 1954: 211.

Types. Lectotype: ♂, "Musée du Congo, Bussin Lukunga,-1935, H. De Saeger" (printed); "*Dasytiscus desaegeri* n. sp." (Pic's MS) (MNHN). - Paralectotype: 1♂, "Musée du Congo "(printed); "Kiambi, 4.V.-1931 " (handwritten); "G.F. de Witte" (printed); "von de wittei mihi" (Pic's MS) (MHNP).

Species related to *D. addilaensis* and allied forms. Black, lustrous, antennal segments 2-4 rufescent. Integument finely and regularly punctate; pubescence whitish, suberect, fine moderately long, seemingly single.

♂ (Fig. 68). Length 2.8 mm; width 1.0 mm. Head wide, eyes prominent, round; surface lustrous, puncturation rather shallow, indistinct, sparse, irregular; intervals with indistinct microsculpture. Terminal segment of maxillary palps subcylindrical; antennal joints 4-10 distinctly serrate, 5-10 more or less transverse. Pronotum strongly transverse, broadest beyond middle, base subarcuate, sides strongly arcuate, apex straight, disc and sides not very finely, rather indistinctly, punctate, intervals polished, broader, than punctures; perimeter bordered, side margins very finely crenate; pubescence arranged from sides towards median longitudinal line, lateral fringe distinct. Elytra parallelsided, apex somewhat attenuate and truncate, surface with shallow, relatively coarse and regular puncturation, intervals with microsculpture, as broad as punctures; sides bordered (visible along distal portion); pubescence rather hirsute but fine, two kinds of hairs cannot be distinguished, lateral fringe not defined due to suberect pubescence. Legs relatively robust.

Pygidium trapeziform; sternum VII nearly straight, VIII (Fig. 69) with slender median process; spicular fork (Fig. 70) with broad and arched spiculae; tegmen (Fig. 71) strongly resembling that in *D. addilaensis;* phallus in side view (Fig. 72) with large base; internal sac with numerous, dark, elongate, spinules.

♀. Unknown.

Distribution: Zaire.

Dasytidius atrimembris (Pic), comb. nov.
Figs 73-78

Dasytiscus atrimembris Pic, 1925: 17.
Dasytiscus Scotti Wittmer, 1954: 136, syn.nov.

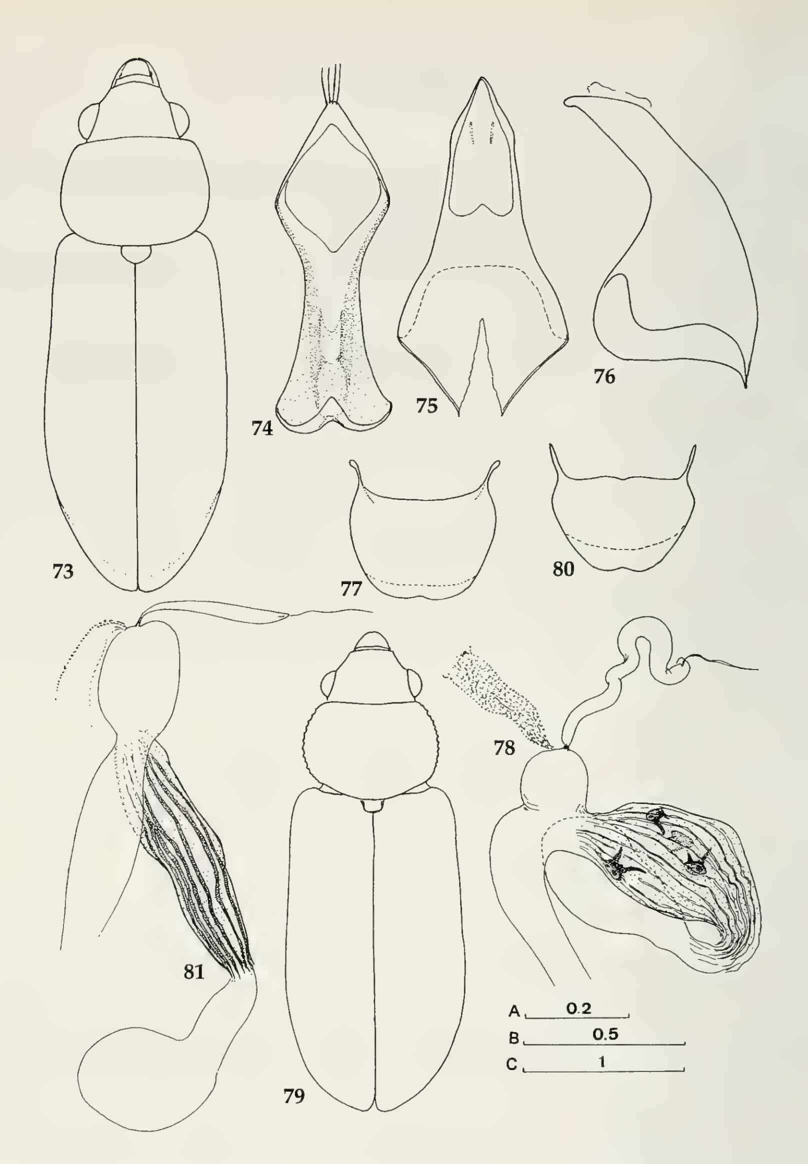
Types. Holotype: ♂, "Maraco abyssinie" (Pic's MS); "type" (yellow label); "*Dasytiscus atrimembris* n. sp." (Pic's MS) (MNHN).

Species mostly resembling *D. desaegeri* (Pic) in completely black coloration, sclerites in seminal canal resemble those in *D. gracilis* (Esc.) but *atrimembris* is most closely allied to *D. addilaensis* (Wittm.).

Coloration completely black, no spur of metallic tinge, upper surface slightly polished; integument with dense texture; pubescence short, almost hirsute, unicolorous (whitish) and single (subdecumbent), only pronotal fringe, several thicker hairs at elytral apex and those on head frons dark.

Head with moderately prominent eyes, surface sparsely and shallowly punctate, intervals nearly glabrous. Pronotum strongly transverse, base subarcuate, apex nearly straight, sides subarcuate; disc regularly and finely punctate, intervals with network texture, scarcely polished, broader than punctures, puncturation denser sidewards; perimeter very finely bordered; pubescence pointing from sides towards a median longitudinal line (as in *D. desaegeri* Pic), side margins scarcely crenate; fringe composed of thicker bristles which are more or less infuscate, distinctly darker than basal pubescence. Elytra very long, with slightly attenuate apex, tips rounded respectively; puncturation somewhat coarser than on pronotum; intervals convex, with microsculpture, as broad as punctures; sides of elytra bordered; pale pubescence rather hirsute, longer, thicker and darker bristles present on elytral apex; lateral fringe not well marked.

♂. Length 3.2-3.4 mm, width 1.1-1.2 mm. Much more slender than ♀. Antenna longer, joints less transverse. Sides of pronotum less arcuate. Pygidium subquadrate; sternum VII weakly produced; VIII with swollen median process; spicular fork ovate, with thin walls, fork proper short; tegmen (Fig. 74) resembles that in *D. addilaensis*; phallus (Figs 75, 76) short, base extremely enlarged; in side view with deep incision; internal sac without distinct spinules.



Figs 73-81. 73-78. *Dasytidius atrimembris* (Pic) (73-76. ♂ Holotype). 79-81. *D. licenti* (Pic), ♀ Lectotype. 73, 79. Body outline. 74. Tegmen ventral. 75. Phallus dorsal. 76. Phallus lateral. 77, 80. ♀ pygidium (all setae omitted). 78, 81. Copulatory organs. Scales: A: Figs 74-76; B: 77, 78, 80, 81; C: 73, 79.

♀ (Fig. 73). Length 3.2-3.4 mm, width 1.2-1.3 mm. Broadening at hind third. Antenna shorter than in ♂, segments more transverse. Pronotal sides more arcuate. Pygidium (Fig. 77) strongly rounded; sternum VII subarcuate, only very briefly tapered; seminal canal (Fig. 78) with longitudinal patterns and peculiar inner spinules.

Distribution. Ethiopia.

Syntypes, 2♂, 2♀, of *D. scotti* (BMNH): "Ethiopia: Doukhamb. 6500-7500 ft., 18.x.[or 20.x.] 1926".

Dasytidius licenti (Pic), comb. nov.
Figs 79-81

Dasytiscus Licenti Pic, 1936: 162.

Types. Lectotype: ♀, "1. VI. 16, Licent /[reverse side] "Vigne vierge [wild vine], Ailanthe"; "*Dasytiscus Licenti* n. sp." (Pic's MS) (MNHN). - Paralectotype: 1♀, "9.VI.16"/ [reverse side] "Licent"; "No 206" (MHNP).

The species seems similar to *D. longiventris* Majer by the structure of seminal canal but its relation to *Dasytidius* is not settled.

Coloration black, upper surface with olivaceous lustre, legs testaceous, mouthparts infuscate, antenna testaceous, scape scarcely infuscate, segments 5-11 gradually darkened towards apex, distal antennal half at the most infuscate. Integument with dense and fine texture, pubescence cinereous, fine and moderately dense, indistinctly dual.

♂. Unknown.

♀ (Fig. 79). Length 2.8-3.0 mm, width 1.1-1.2 mm. Head with small eyes, surface with very dense and fine, rather scabrose sculpture, therefore nearly dull. Antenna slender and long, with subserrate segments. Pronotum transverse, disc weakly polished, with fine and dense, rather regular texture, puncturation only indicated, sides more rugose, side margins with small regular denticles, pubescence pointing towards a point near base. Elytra rounded respectively at apex, surface shallowly and densely punctured, punctures partly confluent into transverse wrinkles, intervals with microsculpture, side margins very finely, indistinctly bordered, apical margin slightly explanate. Pygidium (Fig. 80) emarginate at apex; sternum VII briefly produced medioapically; seminal duct weakly sclerotized, with linear sculpture (Fig. 81).

Distribution: China.

Mimothrix pamirensis, spec. nov.
Figs 82, 83

Types. Holotype: ♂, "Kurovat' Pamir 10/VIII 93 N. Bogoyavlensk" (Printed in Cyrillic) (ZMUM).

Species very closely related to *M. roshtkalensis* Majer, from which it differs strikingly by antennal segments not transverse and elytra less lightened, phallus much more slender, with big prominent spinules.

♂. Length 4.0 mm, width 1.5 mm. Black, slightly shiny, with aeneous lustre, puncturation dense, fine, rather coriaceous, extremities rufotestaceous, antennal segments 1 and 9-11 more or less darkened. Elytra rufopiceous, humeral portion darkened. Pubescence white, dual, decumbent, rather villose, with sparse, erect longer hairs which are subseriate on elytra. Antenna about two fifths longer than pronotum, segments subserrate, no one is transverse. Eyes rather flat and weakly prominent, head subrostrate. Pronotum indistinctly transverse, finely and densely punctured, sides rounded, side margins indistinctly crenate, with sparse fringe. Elytra sharply bordered along side margins, borders nearly canaliculate, elytral apices weakly obliquely truncate respectively, sutural angles slightly rounded.

Pygidium about twice broader than long, indistinctly emarginate; sternum VII nearly straight; VIII as in other species, spicular fork slender; tegmen (Fig. 82) with truncate apex; phallus (Fig. 83) rather slender, subsinuate, with prominent big spinules.

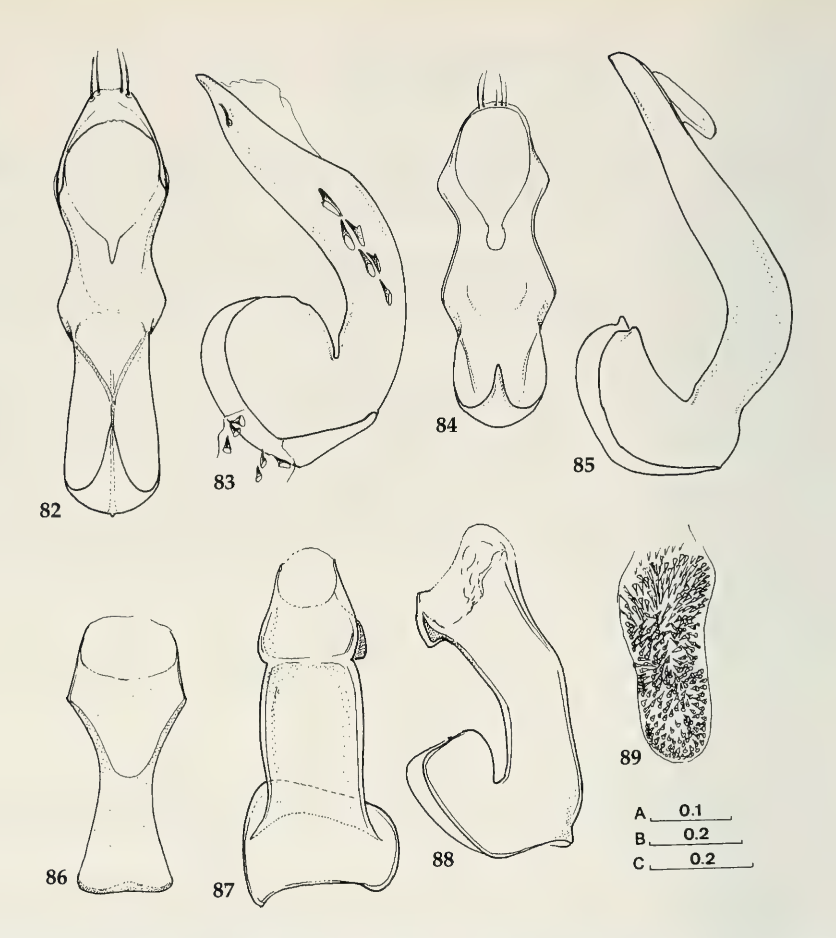
Distribution. Tajikistan (Pamir).

Achaetomalachius rosti, spec. nov.
Figs 84, 85

Types. Holotype: ♂, "Kulu, 7000 F" (Rost's MS); "Kulu Himalaya" (printed) (MNHN).

Easily recognizable by combination of testaceous extremities and very dense greyish fundamental pubescence, with only light bristles on pronotum.

Coloration black, with slight greenish reflexes but upper surface completely covered with very dense subvillose pubescence (which has no analogy in the genus *Achaetomalachius)*, extremities rufotestaceous,



Figs 82-89. 82, 83. *Mimothrix pamirensis*, spec. nov., ♂ Holotype. 84, 85. *Achaetomalachius rosti*, spec. nov., ♂ Holotype. 86-89. *Dasytiscus strejcekorum*, spec. nov., ♂ Holotype. Scales: A: Figs 86-89; B: 82, 83; C: 84, 85.

antennal scape, distal pat of antenna, maxillary palps and claws strongly infuscate, distal antennal segments nearly piceous.

♂. Length 3.3 mm, width 1.2 mm. Head with coriaceous sculpture, along inner eye margins with 3-5 longer light setae, antennal segments 4-10 subtriangular, no one is transverse, 10 scarcely longer than wide. Pronotum weakly transverse, base and sides jointly rounded, sculpture as on head, basal pubescence points towards centre, side margins with 8-10 very small but prominent denticles, each bearing one to two long light setae. Elytra very finely bordered along side margins, apex subtruncate and inconspicuously inflated, sutural angles distinctive, upper surface with dense and coriaceous, fine puncturation, marginal fringe short but distinct, longer hairs are present on humeri and along apical margin.

Pygidium broadly trapeziform. Sternum VII conspicuously produced medioapically. Tegmen (Fig. 84) and phallus (Fig. 85) shown.

Distribution: N India.

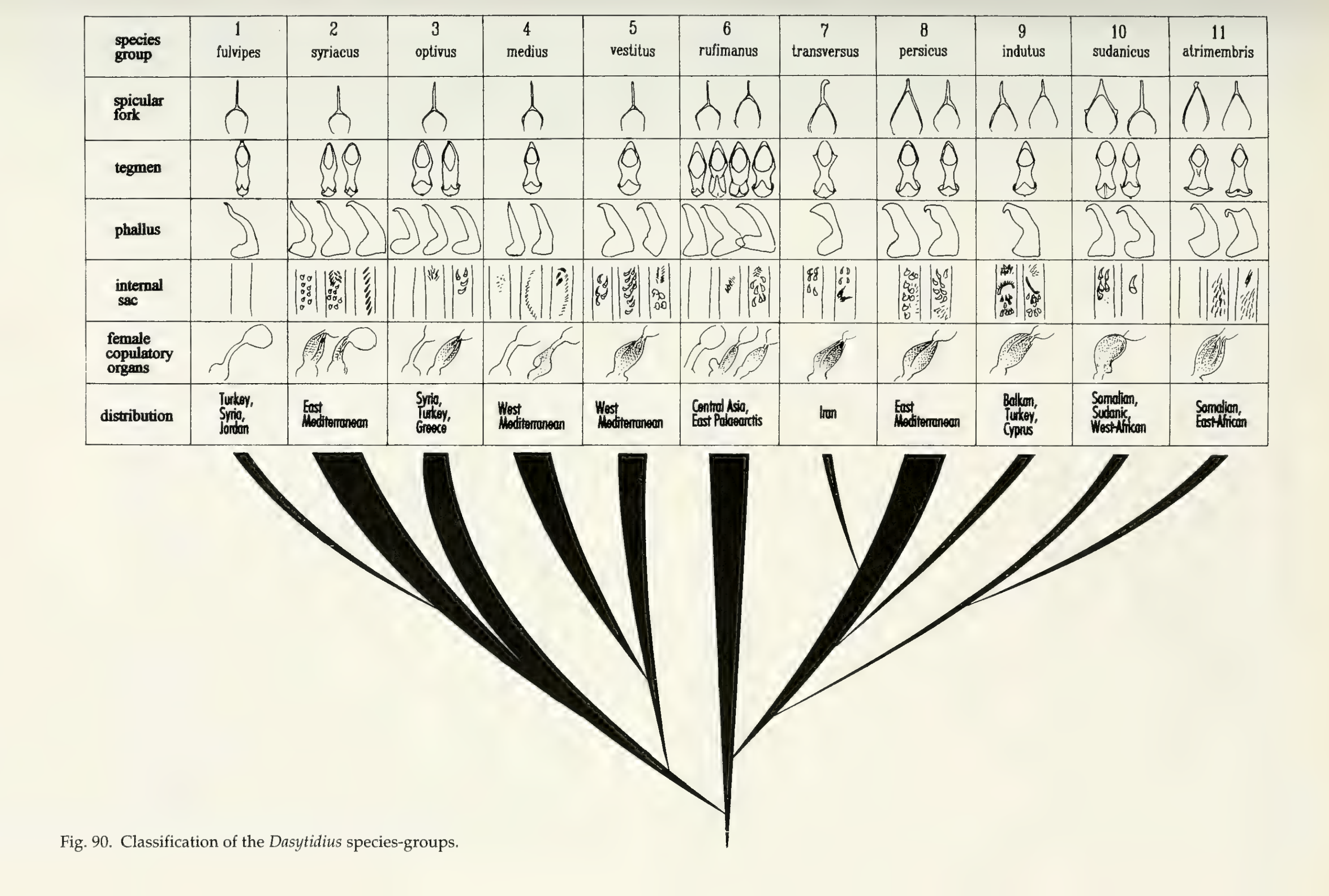


Fig. 90. Classification of the *Dasytidius* species-groups.

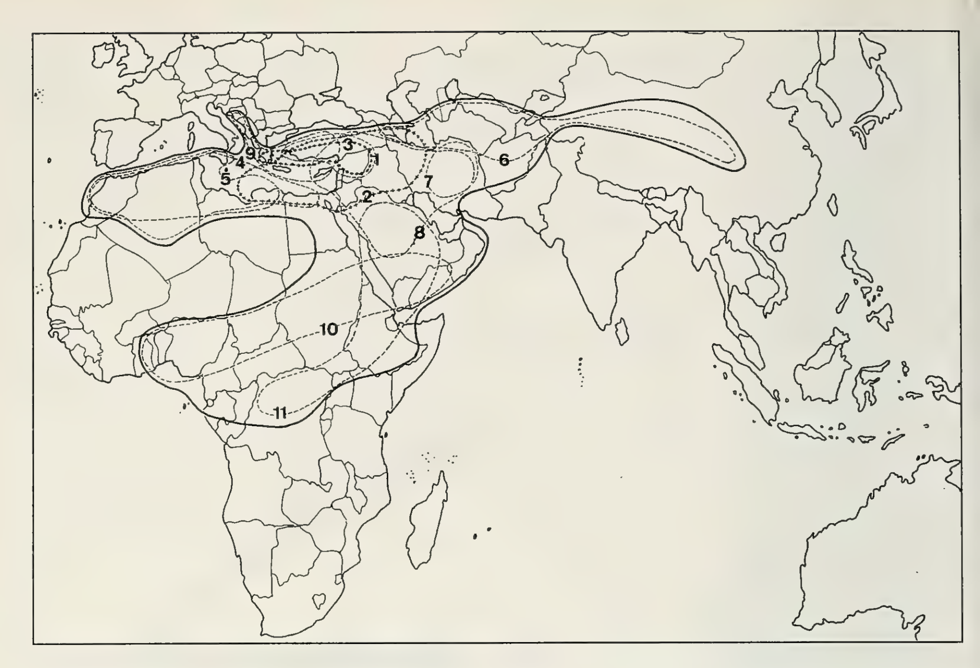


Fig. 91. Distribution of the *Dasytidius* species-groups. The numbers indicate the respective species-groups as in text.

Dasytiscus strejcekorum, spec. nov.
Figs 86-89

Types. Holotype: ♂, "USSR, Armenia Erivan (Razdan) 7.6.1988 J.Strejček leg." (KMBC). - Paratypes: 6♂♂, 4♀♀, same data (KMBC); 2♂♂, 4♀♀, "ARMENIA, 27.5.1989 Erivan, Upper Razdan, steppe ruderal, E. Strejčková leg." (KMBC).

The species is strongly resembling and very closely related to *D. hladili* (Majer, 1988) from which it differs in antennal segments 2 (-4) rufotestaceous, pronotum and elytra less lustrous and more densely punctured and chiefly in the absence of big rounded spinules in the internal sac.

Shiny, dark-brown, antennal segments 2 (-4), ends of femora, tibiae and tarsi rufotestaceous. Punctures moderately dense, fine. Pubescence almost decumbent, fine and short, whitish. Antenna one fifth longer than pronotum, segments 6-10 weakly transverse, 6 and 8 strongly smaller than neighbouring, 4 elongate, subtriangular, 5 strikingly triangular, 11 conical and as long as 9 and 10 together. Eyes large, moderately prominent. Pronotum one fifth broader than long, base and apex subarcuate, side margins with 4-7 weakly prominent marginal denticles; hairs converging at a point at basal fifth. Elytra subtruncate at apex, sutural angles weakly rounded respectively.

♂. Length 2.1-2.5 mm, width 0.7-0.9 mm. Parallel sided. Antennal segments more robust; elytral apex more truncate, sutural angles more prominent. Pygidium three- times broader than long, shallowly and broadly emarginate; spicular fork, sternum VII and VIII without distinctive characters; tegmen (Fig. 86) strongly angled at sides preapically, phallus dorsally and laterally (Figs 87,88) most resembling that in *D. schereri* Majer but internal sac (Fig. 89) without stout round spinules.

♀. Length 2.3-2.7 mm, width 0.8-1.0 mm. Slightly broadening. Antennal segments finer, elytral apices rounded, terminalia as in *D. hladili* but pygidium more transverse.

Distribution. Armenia.

Dasytiscus minimus (J. Sahlberg, 1903)

Dasytiscus ruficollis var. *bicoloriceps* Pic, 1926: 1, syn. nov.

Holotype: ♀, "Transkaspia Saramsakli" (printed); "*D. ruficollis* v. *bicoloriceps* Pic" (MHNP).

It does not differ from *Dasytiscus minimus* (J. Sahlb.).

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Further notes on the biology and food plants of the Australian belid weevil, *Rhinotia haemoptera* Kirby

(Insecta, Coleoptera, Belidae)

By **Trevor J. Hawkeswood** & **James R. Turner**

Hawkeswood, T. J. & J. R. Turner (1996): Further notes on the biology and food plants of the Australian belid weevil, *Rhinotia haemoptera* Kirby (Insecta, Coleoptera, Belidae). – Spixiana **19/2:** 183-186

New observations are provided on the adult food plants of the Australian belid weevil, *Rhinotia haemoptera* Kirby. Adults were observed during late September 1994 in the lower Blue Mountains, New South Wales, Australia, on the following plants, i.e. *Acacia linifolia* (Vent.) Willd., *A. obtusifolia* A. Cunn., *A. suaveolens* (Sm.) Willd. and *A. ulicifolia* (Salisb.) Court (Mimosaceae) and *Hakea dactyloides* (Gaertn.) Cav. (Proteaceae), either feeding on the leaves, seed pods or flowers. The new data are discussed with previously recorded data for the beetle.

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Introduction

The Australian belid weevil, *Rhinotia haemoptera* Kirby (Fig. 1), was first described by Kirby (1818: 426-427, plate XXII, fig. 7) from "Australasia". Since then, modern reviews on the biology and host plants (both adult and larval) of the species have been provided by Hawkeswood (1990) and by Hawkeswood, Turner & LeBreton (1994). Since these papers have been published, the present authors have made further observations and collections of the species from its natural habitat and these data are provided below for the first time.

Observations

a. Study area.

During 24 September 1994, the authors surveyed vegetation growing on both sides of a fire trail in the lower Blue Mountains, about 6 km SW of Glenbrook, New South Wales (33°48'S, 150°36'E). The fire trail was surveyed for about 4 km during the morning and a return journey was undertaken during the afternoon. The vegetation of the area is dry sclerophyll forest and woodland, dominated by various species of *Eucalyptus* (Myrtaceae), with a relatively thick understorey of species of *Hakea, Persoonia, Lambertia* and *Lomatia* (Proteaceae), *Acacia* (Mimosaceae), *Daviesia, Pultenaea, Dillwynia* and *Phyllota* (Fabaceae) and with many other small shrubs, sedges and grasses. The soil is skeletal to deeper and the parent material is quartz sandstone. The elevation along the fire trail changed from approx. 250 to 500 m above sea level. The temperature varied from 22-25 °C and at times a strong southerly breeze blew. The area had received very little rain during the previous six months and there was a thick

covering of dry leaves, sticks, branches and twigs on the ground and amongst the shrubs. Fire danger warnings had been issued during the week.

b. Food plants.

1. *Acacia linifolia* (Vent.) Willd. (Mimosaceae). This plant species is a graceful shrub growing to about 2 m tall with very slender branches; the phyllodes are linear-lanceolate in shape, 2-4 cm long and 1-3 mm wide and are glabrous; the species is widespread in heathlands and dry sclerophyll forests; the flowers are pale yellow and flowering occurs during January to August (Beadle 1975). At least 15 specimens of *R. haemoptera* were observed on the foliage of non-flowering plants and others were observed to alight on the foliage from the nearby bushland. At least one *R. haemoptera* was observed feeding on young leaves in a cluster at the end of a branchlet (Tab. 1).

2. *Acacia obtusifolia* A. Cunn. (Mimosaceae). This plant is a shrub to small tree growing to 5 m tall, with dark green foliage measuring 9-20 cm in length and 7-25 mm in diameter and flowers from December to February (Beadle 1975, Costermans 1981). At least two beetles were collected from this species, one of which was feeding on a young phyllode. Plants were non-flowering at this time. In captivity, beetles fed extensively on both young and old mature phyllodes of this wattle.

3. *Acacia suaveolens* (Sm.) Willd. (Mimosaceae). This plant species is a slender shrub growing to about 1-2 m high with angular branches; the phyllodes are narrow-oblong to linear-lanceolate in shape measuring up to 12 cm long and 4-10 mm wide, and are glabrous and glaucous; the species is widespread in heathlands and dry sclerophyll forests and flowering occurs during March to August (Beadle 1975, Costermans 1981, Simmons 1987). Most of the young plants along the fire trail carried seed pods (legumes); in this species, the legumes are oblong in shape, flat, glaucous, and measure 2-4 cm long and 12-20 mm wide (Beadle 1975). A number of *R. haemoptera* adults were observed feeding on the legumes at the tops of plants (Fig. 1); feeding resulted in about 20-30 % of the legume nearest the pedicel being chewed; the proboscis of the adults are probed into the cuticle and epidermis and into the seed cavity of the pod. Another beetle was observed to chew on a pedicel and young phyllode of a small *A. suaveolens* plant. Upon the legumes, *R. haemoptera* chewed holes 0.8-2.0 mm in diameter, many of them coalescing (Fig. 1).

4. *Acacia ulicifolia* (Salisb.) Court. (Mimosaceae). This plant is scattered but widespread throughout dry sclerophyll forests and heathlands in the Blue Mountains where it is a variable, rigid, much-branched, prickly shrub, often with drooping branches; the phyllodes are prickly, green, scattered or crowded, measure 7-14 mm long and 0.6-1.5 mm wide, with a prominent nerve on each side, tapering into a very long, sharp point; the species flowers from July to September (Beadle 1975, Costermans 1981, Simmons 1987). Five specimens of *R. haemoptera* were collected from the flowers where they appeared to be feeding on pollen; although beetles often crawled over foliage, no feeding on the phyllodes were observed (Tab. 1).

5. *Hakea dactyloides* (Gaertn.) Cav. (Proteaceae). This plant is a straggly shrub growing to 1-3 m high, with flat leaves, measuring 5-10 cm long and 5-25 mm wide; the species is widespread in gullies on sandstone in open forests and heathlands (Beadle 1975, Costermans 1981). Two specimens of *R. haemoptera* were collected from foliage of two flowering plants but it was not clear whether they were feeding before capture (Tab. 1). Beetles placed in plastic bags with this plant did not appear to feed on the leaves over a two-week period.

Table 1. Feeding data for *Rhinotia haemoptera* Kirby adults observed/collected in the lower Blue Mountains, New South Wales on 24 Sept. 1994 by the authors

Plant species	Family	Food		
		Flowers	Seeds	Leaves
Acacia linifolia (Vent.) Willd.	Mimosaceae	–	–	+
Acacia obtusifolia A. Cunn	Mimosaceae	–	–	+
Acacia suaveolens (Sm.) Willd.	Mimosaceae	–	+	+
Acacia ulicifolia (Salisb.) Court	Mimosaceae	+	–	–
Hakea dactyloides (Gaertn.) Cav.	Proteaceae	–	–	?

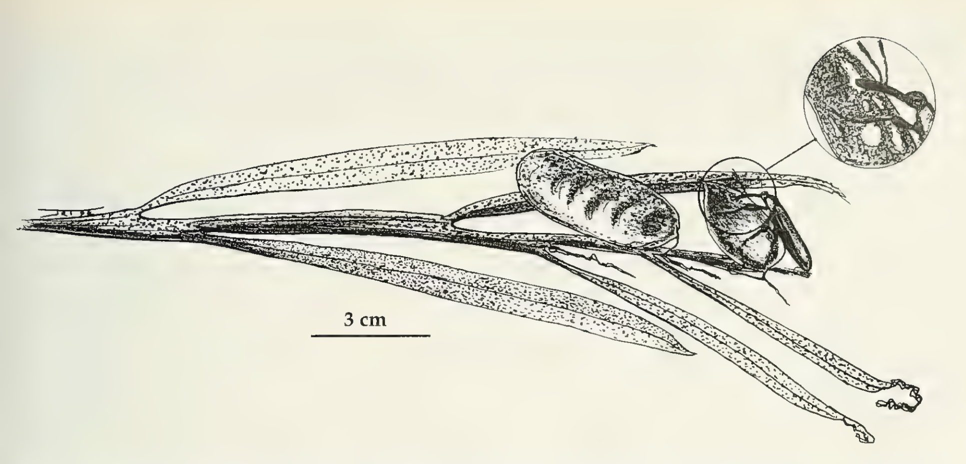


Fig. 1. Adult of *Rhinotia haemoptera* Kirby feeding on the developing legume at the top of a branch of *Acacia suaveolens* (Sm.) Willd. (Mimosaceae) from south of Glenbrook, New South Wales. (Drawing: J. R. Turner).

Discussion

Rhinotia haemoptera Kirby was common along the fire trail and this abundance was probably due to two factors, i.e. 1. sudden warm weather following a long cold winter which had induced a mass emergence of adults, and 2. abundance of vigorous flowering and non-flowering *Acacia* host plants growing in exposed situations enabling easy access and food for the beetles.

Acacia linifolia has been recorded by Hawkeswood, Turner & LeBreton (1994) as a plant associate of *R. haemoptera*, but feeding on this species had not been previously observed. Near Glenbrook, the beetles were commonly attracted to *A. linifolia*, where adults mostly rested on the foliage or occasionally nibbled the young terminal leaflets. This new data therefore verifies *A. linifolia* as an adult food plant.

Hawkeswood, Turner & LeBreton (1994) first recorded *Acacia obtusifolia* as a larval host plant for the belid but adult feeding on foliage or flowers had not been observed. Near Glenbrook, although *A. obtusifolia* is common in patches, it does not appear to be a preferred adult host, although a limited number of adults may feed on the young foliage only.

Froggatt (1893) recorded *Acacia suaveolens* as a larval host plant for *R. haemoptera*, but the utilization of this plant by adults had not been previously recorded (Hawkeswood, Turner & LeBreton 1994). Our recent observations show that adults prefer chewing on the tissues of developing legumes of *A. suaveolens* and less commonly on leaves. We did not observe any evidence of larval feeding, probably because the plants along the fire trail were mostly very thin-stemmed young plants, not suitable for larval development.

The prickly *Acacia ulicifolia* has not been recorded previously as an adult food plant of *R. haemoptera* (Hawkeswood, Turner & LeBreton 1994). Our observations indicated that leaves of *A. ulicifolia* were not attacked by *R. haemoptera*, probably because of the small, prickly and tough fibrous nature of the leaves which make them unpalateable. The beetles appeared to be mostly attracted to the flowers where pollen from the anthers was consumed (Tab. 1).

Hakea dactyloides is probably not an adult host plant for *R. haemoptera* and adults were not observed on the flowers; adults apparently failed to feed on leaves in captivity and avoided the flowers and fruits when offered. Tepper (1887) briefly noted that adults of *R. haemoptera* visited flowers of *Hakea* sp. in South Australia, but Hawkeswood, Turner & LeBreton (1994) questioned this old record. Our recent observations near Glenbrook did not support Tepper's statements and suggest strongly that *Acacia* flowers, leaves and/or seed pods (legumes) are the preferred food of *R. haemoptera* adults.

The known adult food plants of *R. haemoptera* with reliable feeding observations are as follows: *Acacia decurrens* (Wendl.) Willd. (leaves), *A. floribunda* (Vent.) Willd. (branches), *A. linifolia* (Vent.) Willd.

(leaves), *A. longifolia* (Andr.) Willd. (leaves), *A. obtusifolia* A. Cunn. (leaves), *A. paradoxa* DC. (leaves), *A. penninervis* Sieb. ex DC. var. *longiracemosa* (leaves), *A. suaveolens* (Sm.) Willd. (leaves, seeds-legumes), *A. terminalis* (Salisb.) MacBride (leaves) and *A. ulicifolia* (Salisb.) Court (flowers). All other purported adult host records in the literature are erroneous or require verification (Hawkeswood, Turner & LeBreton 1994).

Arnol'di et al. (1991) have studied the Mesozoic Coleoptera of Russia and neighbouring areas and have described a number of fossil weevils belonging to the families Eobelidae, Attelabidae and Curculionidae and noted that during the late Jurassic, the Rhynchophora (weevils) turned out to be the most diverse and most abundant group in terms of species of all the Polyphaga. Arnol'di et al. (1991) further noted that the recent finds of Triassic beetles show clearly that these Coleoptera differ very little from the earlier Jurassic Eobelidae, such that this fact compelled them to regard the Rhynchophora as the most ancient of the Polyphaga. These authors move on to state that the present day Belidae, which inhabit Australia, South America and southern North America (and hence display a Gondwanian distribution) possess many indisputably archaic morphological features (in the adults) in addition to a few specialized characteristics. These authors regard the Australian genus *Rhinotia* as the most primitive representative of the recent species of the family Belidae, since its general appearance is very similar to that of the late Jurassic "belidoid" Rhynchophora. However, these authors also state that the Jurassic weevils that they described differed from modern-day Belidae in the form of the pronotum and antennae and in other important morphological characters of the adults, such that they could not possibly be included within the family Belidae. Thus it would appear that *Rhinotia* is a somewhat more advanced genus which probably first appeared in Australia during the Tertiary Period when flowering plants rapidly evolved and speciated to dominate the ecosystems of the continent and when interrelationships between these flowering plants and insects were beginning to co-evolve (White 1990). *Acacia* does not appear in the fossil pollen record until the Miocene Epoch of the Tertiary Period (23.7-5.3 million years BP), when the arid areas of Australia were well developed with their sclerophyllous vegetation (White 1990). So, assuming that *Rhinotia* did not shift food plant preferences during the early stages of its evolution, *R. haemoptera* has probably co-evolved with *Acacia* for at least 5.5 million years, although fossil evidence is badly needed to shed more light on the probabilities of this suggestion.

Acknowledgements

We would like to thank the New South Wales National Parks and Wildlife Service for permission to enter and collect from areas under their jurisdiction.

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A new species of *Hydropsyche* of the *pellucidula*-group*

(Insecta, Trichoptera, Hydropsychidae)

By **Renato De Pietro**

De Pietro, R. (1996): A new species of *Hydropsyche* of the *pellucidula*-group (Insecta, Trichoptera, Hydropsychidae). – Spixiana **19/2:** 187-193

The adult (♂, ♀) and larval (5th instar) characters of *Hydropsyche morettii*, spec. nov. belonging to the *pellucidula*-group are described and illustrated. Information on ecology and phenology is also given.

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Introduction

During my investigations on the genus *Hydropsyche* in Sicily, many populations of a new species belonging to the *pellucidula*-group (Marinkovic-Gospodnetic 1979, Botosaneanu & Giudicelli 1981, Malicky 1983, Moretti 1991, Pitsch 1993a) were found. The new species is closely related to *H. pellucidula* (Curtis, 1834). Electrophoretic investigations on the populations of these two taxa (De Pietro et. al. in prep.) confirm their differentiation at the specific level.

H. pellucidula, although previously mentioned for the island (Moretti & Cianficconi 1981, Botosaneanu et al. 1986, Cianficconi & Moretti 1990, 1991), was never found, despite my investigation in Sicily covered many streams. Therefore, citations of *H. pellucidula* for Sicily are to be referred probably to the new species.

Research extended also to many centro-meridional Italian streams, suggests that the new species distribution extends from Sicily to Campania and that *H. pellucidula* has in this region its southernmost limit. The coexistence of *H. morettii* and *H. pellucidula* has been ascertained for two sites of the rivers Sele and Tanagro in Campania.

Hydropsyche morettii, spec. nov.

Types. Holotype: ♂, Sicilia, F. San Paolo, Francavilla di Sicilia 23/6/94 (ZSM - Zoologische Staatssammlung München). - Allotype: ♀, same data (ZSM).

Examined Material.

For each collecting site the stream, elevation, closest inhabited area and abbreviation of the province are indicated. The adult specimen obtained by the rearing of larvae or pupae are placed within parenthesis; L stands for larvae and P for pupae. The material is partly preserved in ZSM, partly in coll. De Pietro, Dipartimento di Biologia Animale, Università di Catania.

* Study performed with a M.P.I. grant, programme "Fauna of the Western mediterranean area". Coordinator: Prof. D. Caruso.

F. Fiumedinisi, 130 m - Fiumedinisi (ME): 15/12/92: 39 LL; 20/7/93: (9♀♀), 5 PP, 28 LL; 23/6/94: (1♂, 1♀), 2 PP, 4 LL.

F. Fiumedinisi, 160 m - Fiumedinisi (ME): 16/7/92: 3 LL; 15/12/92: (1♂), 28 LL; 20/7/93: (1♂, 5♀♀), 35 LL; 21/9/93: (4♀♀); 17/1/94: 1 L; 11/8/94: (3♂♂), 2 PP, 18 LL; 7/10/94: (3♀♀), 2 PP, 23 LL.

T. Santissima, 320 m - Fiumedinisi (ME): 15/12/92: 7 LL: 4/12/93: 5 LL; 17/1/94: 3 LL; 4/3/94: 1 L: 23/6/94 2 LL.

V. Soldato, 620 m - Fiumedinisi (ME): 27/8/92: 1 L; 15/12/92: 1 L; 20/7/93: 1 L; 21/9/93: 1 P, 4 LL; 17/1/94: 1 L; 7/5/94: 1 L; 23/6/94: 1 L; 7/10/94: 1 L.

T. Capitanello, 400 m - Fiumedinisi (ME): 20/7/93: 4 LL: 21/9/93: 9 LL; 11/8/94: 1 L.

T. Vacco, 350 m - Fiumedinisi (ME): 26/8/92: 2♂♂, 3 LL; 15/12/92: (1♀), 5 LL; 20/5/93: 1 L; 20/7/93: (1♀), 26 LL; 21/9/93: 26 LL: 11/8/94: 9 LL; 7/10/94: 5 LL.

F. di Colonnina, 400 m - Fiumedinisi (ME): 15/12/92: 20 LL; 20/5/93: 1♂; 20/7/93: 1 P, 3 LL: 21/9/93: 10 LL.

F. Mela, 130 m - S. Lucia del Mela (ME): 12/4/95: 3 PP, 5 LL.

T. di Antillo, 270 m - Antillo (ME): 16/7/92: 8 LL: 23/2/93: 4 LL; 20/7/93: 3 LL.

T. di Antillo, 470 m - Antillo (ME): 23/2/93: 1 L.

Aff. T. di Antillo, 500 m - Antillo (ME): 23/2/93: 3 LL.

F.ra d'Agrò, 140 m - Mitta (ME): 23/2/93: 6 LL.

F. Alcantara, 750 m - Randazzo (CT): 10/10/92: 7 LL.

F. Alcantara, 480 m - Moio Alcantara (ME): 28/6/92: 39 LL; 10/10/92: (1♀), 4 LL.

F. Alcantara, 90 m - Mitogio (ME): 28/6/92: 17 LL.

F. Alcantara, 50 m - Calatabiano (CT): 5/2/93: 17 LL.

F. Alcantara, 0.5 m - Giardini Naxos (ME): 16/7/92: 2 LL; 5/2/93: 3 LL.

F. San Paolo, 220 m - Francavilla di Sicilia (ME): 28/6/92: 1♂, 3 LL; 8/1/93: 20 LL; 25/6/93: 5 PP, 31 LL; 15/1/93: 28 LL; 4/2/94: 1 L; 18/5/94: 9 LL; 11/8/94: 1 P, 1 L.

F. San Paolo, 350 m - Francavilla di Sicilia (ME): 28/6/92: 13 LL; 8/1/93: 7 LL.

F. San Paolo, 450 m - Francavilla di Sicilia (ME): 28/3/92: 2 LL; 28/6/92: 1 P, 31 LL; 10/10/92: 7 LL; 8/1/93: 19 LL; 3/4/93: 2 LL; 25/6/93: 1 P, 21 LL; 9/9/93: (3♀♀), 1 P, 9 LL; 15/11/93: 10 LL; 4/2/94: 3 LL; 26/3/94: 3 LL; 18/5/94: 1 P, 1 L; 23/6/94: (1♂, 1♀), 1 P, 3 LL; 11/8/94: 8 LL.

Aff. F. San Paolo, 465 m - Francavilla di Sicilia (ME): 8/1/93: 4 LL; 3/4/93: 5 LL; 25/6/93: 6 LL; 9/9/93: 1 L; 15/11/93: 3 LL; 23/6/94: 3 LL.

F. di Mancina, 470 m - Francavilla di Sicilia (ME): 28/6/92: 8 LL; 25/6/93: 5 LL.

F.so Scavuzzo, 585 m - Malvagna (ME): 28/3/92: 8 LL; 28/6/92: 11 LL; 10/10/92: 4 LL; 8/1/93; 4 LL; 3/4/93: 10 LL; 25/6/93: 1♂, 3 LL; 9/9/93: 2 LL; 15/11/93: 3 LL; 26/3/94: 1 L; 23/6/94: 2 LL.

F. so Scavuzzo, 670 m - Malvagna (ME): 28/6/92: 2 LL; 15/11/93: 2 LL; 23/6/94: 1 L; 11/8/94: 1 L.

Aff. F. so Scavuzzo, 630 m - Malvagna (ME): 3/4/93: 2 LL; 15/11/93: 1 L; 23/6/94: 2 LL: 7/10/94: 1 L.

T. Licopeti, 750 m - Roccella Valdemone (ME): 10/10/92: 1 L; 14/4/93: 1 L; 9/9/93; 4 LL.

T. Petrolo, 320 m - Graniti (ME): 8/1/93: 2 LL.

T. San Cataldo, 250 m - Motta Camastra (ME): 14/4/93: 1 L.

F. Flascio, 940 m - Randazzo (CT): 24/10/92: 26 LL.

F. Simeto, 460 m - Bronte (CT): 17/11/92: 95 LL; 27/5/93: (1♂, 3♀♀), 5 PP, 13 LL.

F. Simeto, 350 m - Adrano (CT): 17/11/92: (1♂), 117 LL.

F. Simeto, 90 m - Paternò (CT): 12/6/93: 2 PP, 6 LL; 10/8/93: (1♂, 1♀), 1 P, 60 LL; 17/5/94: 1 L; 18/6/94: 2 PP.

F. Simeto, 25 m - Motta S. Anastasia (CT): 12/6/93: (1♂), 5 LL; 18/6/94: 2 PP; 17/5/94: 1 L.

T. Saracena, 1180 m - Maniace (CT): 5/8/92: 2♀♀, 2 LL; 11/9/93: 2 LL.

Aff. T. Saracena, 1285 m - Maniace (CT): 23/4/94: 1 L.

T. Saracena, 750 m - Maniace (CT): 1/9/92: 68 LL; 24/10/92: 44 LL; 17/11/92: 31 LL: 8/6/93: 2 PP, 18 LL: 2/7/94: (1♂, 1♀), 8 LL.

T. Martello, 1000 m - Petrosino (CT): 25/5/94: 2 LL; 30/5/94: 2 LL.

T. Martello, 850 m - Petrosino (CT): 25/5/94: (1♀), 11 LL.

T. Martello, 685 m - Petrosino (CT): 30/5/94: (3♀♀), 5 LL.

F. Serravalle, 570 m - Bolo Fiorentino (ME): 17/11/92: 63 LL; 27/5/93: 2 PP, 41 LL.

F. di Cerami, 420 m - Agira (EN): 18/2/93: 5 LL.

F. di Caltagirone, 60 m - Ramacca (CT): 11/1/93: 3 LL.

F. Gornalunga, 360 m - Aidone (EN): 3/8/93: (1♂), 1 L.

T. Belluzza, 100 m - Villasmundo (SR): 17/6/93: 1 L; 17/8/93: 1 L.

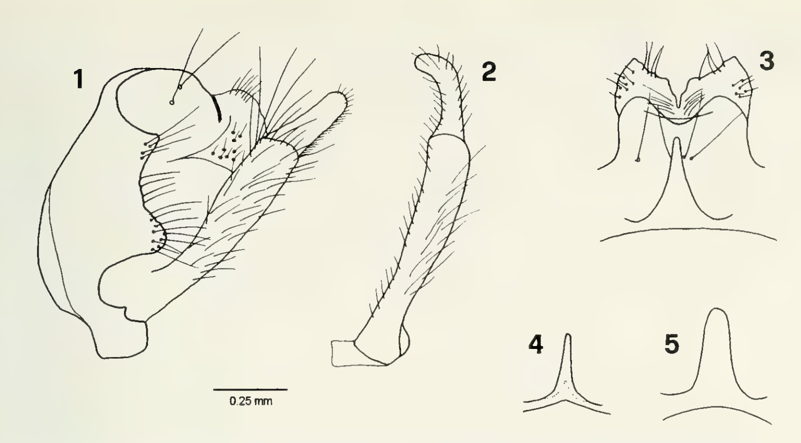
F.ra Grande, 320 m - Sortino (SR): 6/11/92: 2 LL.

F. Anapo, 370 m - Cassaro (SR): 6/11/92: 19 LL; 17/8/93: 2 LL; 28/9/93: 45 LL; 8/12/93: (1♀), 7 LL; 21/1/94: (1♀), 10 LL; 11/3/94: 5 LL; 30/4/94: (1♀), 3 PP, 2 LL; 10/6/94: (1♂), 39 LL; 25/7/94: (3♂♂, 3♀♀), 5 PP, 78 LL; 24/9/94: (1♂), 3 PP, 36 LL.

F. Anapo, 70 m - Floridia (SR): 6/11/92: 1♀, 43 LL.

T. Passanetello, 300 m - Francofonte (SR): 1/12/92: (1♂, 1♀), 2 LL.

F. Vizzini, 320 m - Vizzini (CT): 14/3/93: (1♀), 49 LL.



Figs 1-5. *Hydropsyche morettii*, spec. nov., ♂ genitalia. 1. Lateral view. 2. Right clasper, ventral view. 3. Dorsal view. 4-5. carina, dorsal view. 1-3. Sicily, F. San Paolo. 4. Sicily, F. Simeto. 5. Sicily, T. Vacco.

F. Amerillo, 330 m - Monterosso Almo (RG): 14/3/93: 27 LL.
F. Amerillo, 440 m - Monterosso Almo (RG): 14/3/93: 8 LL.
F. Dirillo, 280 m - Acate (RG): 14/3/93: 2 LL.
F. Irminio, 550 m - Giarratana (RG): 14/3/93: 2 LL.
F. Verdura, 30 m - Ribera (AG): 29/4/93: 7 LL.
F. Sosio, 190 m - S. Carlo (AG): 29/4/93: (3♀♀), 59 LL.
F. Sosio, 590 m - Prizzi (PA): 29/4/93: 16 LL.
F. Platani, 410 m - Castronuovo (PA): 22/4/95: 65 LL.
F. Imera settentrionale, 240 m - Scillato (PA); 15/9/94: (1♂, 1♀), 28 LL.

Calabria

F. ra di Boscaino, 110 m - Castellace (RC): 15/10/93: 2 PP, 12 LL.
T. Diverso, 350 m - S. Giorgia (RC): 15/10/93: 7 LL.
V. del Salice, 550 m - S. Giorgio (RC): 13/10/93: (1♀), 3 PP, 23 LL.
F. ra di Platì, 430 m - Platì (RC): 12/10/93: 7 LL.
T. Abbruschiato, 430 m - Cirella (RC): 12/10/93: (1♀), 1 P, 8 LL.
F. ra Novito, 130 m - Agnana (RC): 14/10/93: (2♂♂, 8♀♀), 7 PP, 46 LL.
F. ra Novito, 320 m - Canolo (RC): 14/10/93: 10 LL.
F. Marepotamo, 80 m - Melicucca (RC): 14/10/93: 8♂♂, 21♀♀, 2 PP, 28 LL.
T. Mentaro, 200 m - Mantirano (CZ): 6/5/93: 1♀, 3 PP, 5 LL.
F. Crati, 80 m - Bisignano (CS): 17/7/94; (1♂, 2♀♀), 1 P, 5 LL.
F. Lao, 190 m - Papasidero (CS): 28/9/94: (2♂♂, 4♀♀), 10 PP, 47 LL.
T. Santo Nocaio, 210 m - Papasidero (CS): 28/9/94: 2 PP, 6 LL.

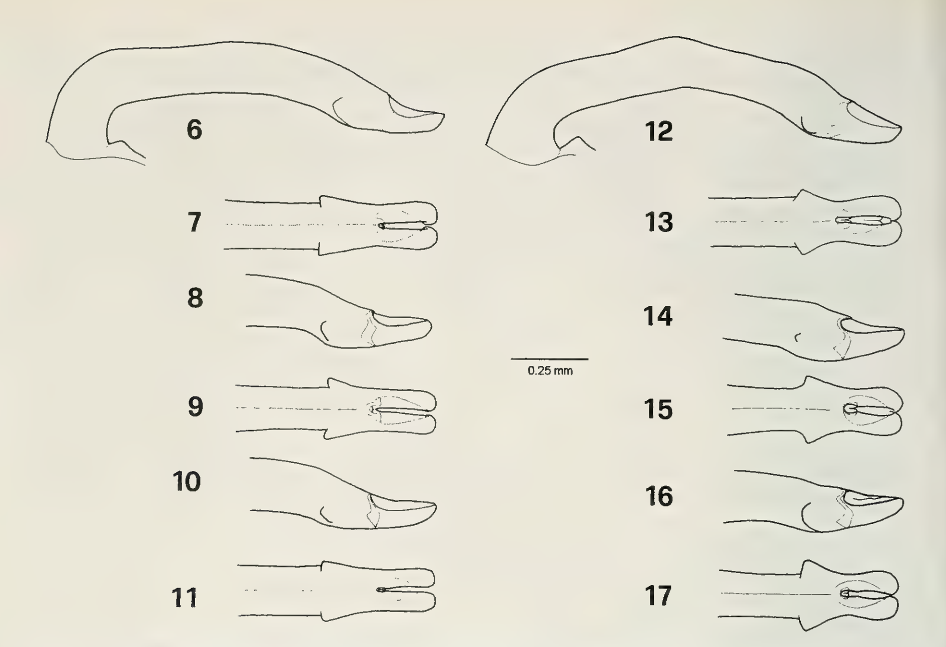
Campania

F. Calore, 500 m - Buonabitacolo (SA): 29/9/94: (2♂♂, 1♀), 2 PP, 22 LL.
F. Tanagro, 210 m - Auletta (SA): 29/9/94: (6♂♂, 10♀♀), 24 PP, 4 LL.
F. Sele, 150 m - Contursi Bagni (SA): 13/7/94: 1 L.

Description

Length of the anterior wings: ♂ 8.59-12.19 mm, ♀ 8.75-14.37 mm. Variable wing colouring: uniformly light or dark brown.

♂ genitalia (Figs 1-11). Dorsally, carina of ninth segment, with variable shape: triangular, more or less wide or very thin. Depressions of ninth and tenth segments large with indistinct boundary between them. Throughout its length aedeagus width is the same; laterally, the aedeagus' central area without dorsal hump or, if present, barely discernable; basal portion of aedeagus forms approximately a right angle. Aedeagus apex elongate and flattened; aedeagus teeth, more or less pointed, basally oriented, of variable



Figs 6-17. Aedeagus, lateral and ventral view. 6-11. *Hydropsyche morettii*, spec. nov. 12-17. *Hydropsyche pellucidula* (Curtis, 1834). 6-7. Sicily, F. San Paolo. 8-9. Sicily, F. Anapo. 10-11. Calabria, F. Lao. 12-15. Campania, F. Sele. 16-17. Lazio, F. Liri.

size but generally small. Lateral lobes of aedeagus parallel or slightly convergent at distal portion. Harpago with flattened extremity. Coxopodite length: 0.67-0.85 mm. Harpago length: 0.25-0.33 mm. Ratio harpago/coxopodite: 1/2.20-1/3.23.

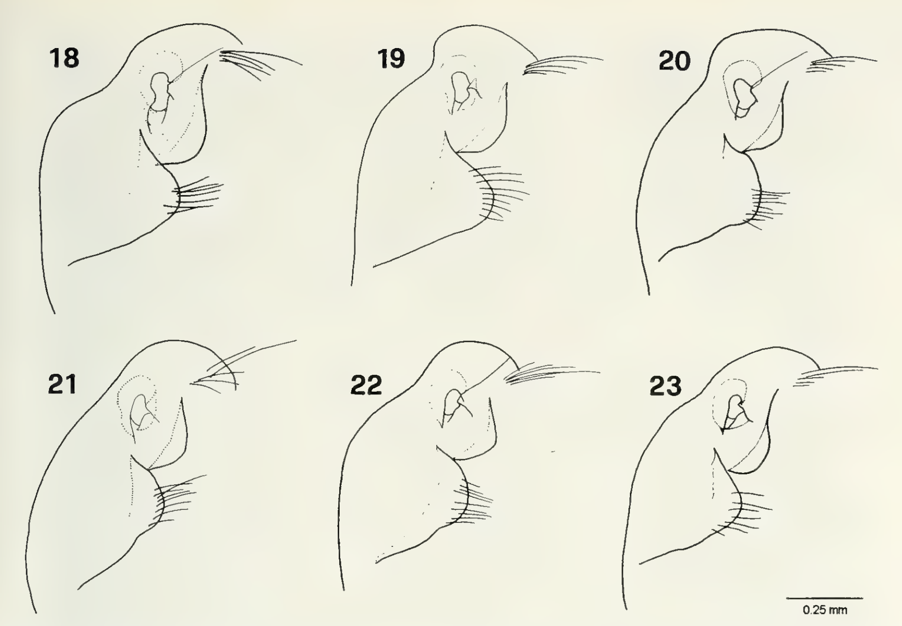
♀ genitalia (Figs 18-20). Dorsal lobe of ninth segment short with wide base. Ventral lobe variable: rounded to pointed. Harpago receptacle foramen elongate dorsoventrally. Foramen anterior margin more or less inwardly curved; in specimens from Calabria and Campania it is less evident but even within Sicilian populations there may be extreme examples of this character.

Larvae (description refers to 5th instar, Figs 24-26). Frontoclypeus nearly triangular. Frontoclypeal lateral margins converging back with a more or less accentuated indentation at about same level of median light spots; frontoclypeal anterior margin straight. Frontoclypeal anterior light spot variable: absent to large, sometimes fused with median spots. Median light spots variable: either small, circular, barely visible or not, or elongate, visible, oriented obliquely. If elongate, there is always a darker lateral portion between the frontoclypeal margin and the spot. The pattern with small, circular, barely visible, median light spots is found more frequently in Sicily and Calabria while that with elongate light spots is predominant in the populations from Campania. Posterior margins of the central dark patch's lateral ramifications (Y-shaped) - placed between the two median light spots - always curved. Posterior light spot normally poorly developed and barely visible; more frequently the populations from Campania have a more developed posterior light spot (V-shaped).

Dorsally, dark area of head extends lateroventrally posterior the eyes without leaving any light portion at lateral margins of head. Ventral area of head variably patterned and shaped. Gula with thin elongate lateral lobes and a central protuberance. Median posterior prosternites wide, quadrangular; clearly visible lateral ones.

There are noticeable differences in the dimensions of specimen belonging to different populations: the specimen from the streams of the Iblei Mountains (Sicily) are the largest while those from the Aspromonte Mountains (Calabria) are the smallest -with other populations intermediate.

Ecology. *H. morettii* is the most widespread species in Sicily; it is present in almost all streams with preference for the middle and terminal portions (metarhithral-epipotamal), except for those that dry



Figs 18-23. ♀ genitalia, lateral view. 18-20. *Hydropsyche morettii*, spec. nov. 21-23. *Hydropsyche pellucidula* (Curtis, 1834). 18. Sicily, F. San Paolo. 19. Calabria, F. Crati. 20. Campania, F. Tanagro. 21-22. Campania, F. Sele. 23. Campania, F. Tanagro.

up or have low flows. It has been found from sea level to about 1300 m. It is present also in some streams with antropogenic changes (sewage inputs, hydraulic regulation, etc.).

Phenology. Adult and pupal specimen can be found from April to November. At the collecting sites at which it is abundant, mature larva are found almost all year long; in such cases there often is the absence of mature larvae only in connection with periods of emergence. In some sites there may be bivoltine cycles.

Chorology. The presence of this species has been ascertained for Sicily, Calabria and Campania (Fig. 30). Further investigation is necessary for the definition of its actual distribution.

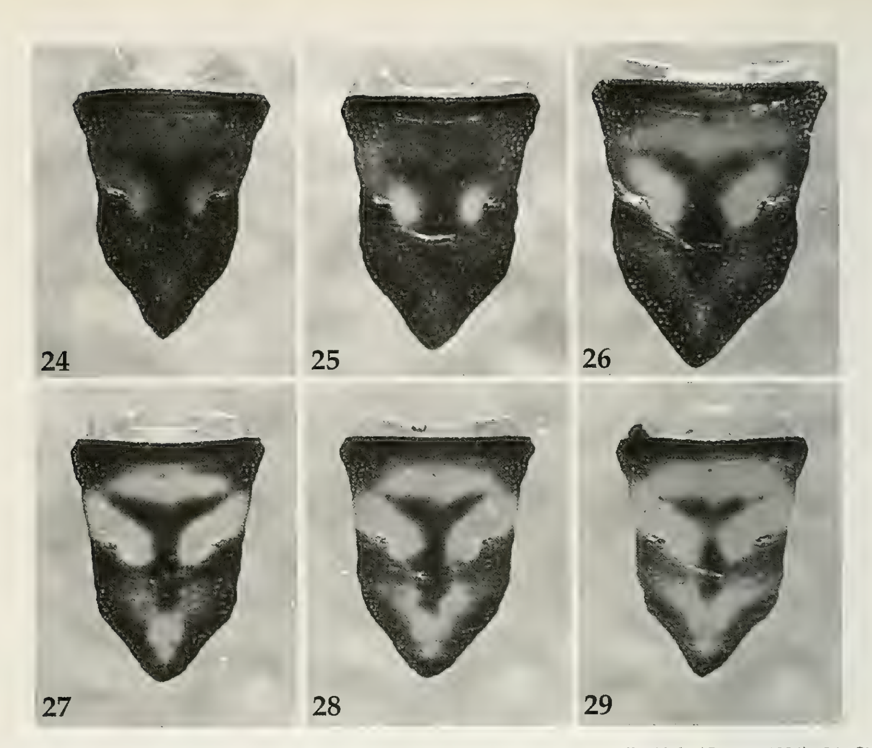
Derivatio nominis. This species is dedicated to Prof. G.P. Moretti, to whom the knowledge of the Italian Trichoptera fauna is mostly due.

Discussion

The new species is closely related to *H. pellucidula*. Of this species larvae and adult Italian specimens, especially from Campania, were examined as well as two German male adult specimens kindly loaned by Dr. W. Tobias.

H. morettii can be differentiated from *H. pellucidula* in the male, by the longer and more flattened aedeagus apex; the aedeagus teeth are basally oriented. Also, the basal angle of the aedeagus is smaller than that in *H. pellucidula*; laterally the aedeagus is straight, with no hump or only a slightly discernable one, while in *H. pellucidula* it is curved with a pronounced dorsal hump. In the females the anterior margin of the receptacle foramen is inwardly curved and not so in *H. pellucidula*. Generally, the dorsal lobe of the IX segment is shorter than in *H. pellucidula*. The pattern of the forewings is more uniform than in *H. pellucidula*.

Of many species of *Hydropsyche* the larval instars are unknown and often larval characters variability makes identification uncertain (Bournaud et al. 1982, Pitsch 1993b). Also *H. morettii* larvae show considerable variation; however, Sicilian larval populations cannot be mistaken for *H. pellucidula* for their characteristic pattern (light and dark spots) of the frontoclypeus and particularly for their



Figs 24-29. Frontoclypeus. 24-26. *Hydropsyche morettii*, spec. nov. 27-29. *H. pellucidula* (Curtis, 1834). 24. Sicily, F. San Paolo. 25. Sicily, F. Fiumedinisi. 26. Sicily, F. Anapo. 27. Campania, F. Tanagro. 28. Campania, F. Sele. 29. Lazio, F. Liri.

(generally) barely visible median light spots; instead, the pattern of the populations of Campania is more similar to that of *H. pellucidula* in which the median light spots reach the frontoclypeal margin and the posterior margins of the central dark patch's lateral ramifications - placed between the two median light spots - are not curved. However, central Italian populations of *H. pellucidula* can have a different pattern.

With respect to the other species of the *pellucidula*-group that appear morphologically more similar, *H. morettii* differs from *H. botosaneanui* Marinkovic-Gospodnetic, 1966 for the wider endotheca that reaches the apex and for the not prolonged ninth and tenth segments. In the female the receptacle foramen of the harpago is more elongated than in *H. botosaneanui*. The larval instars of *H. botosaneanui* are unknown.

H. morettii differs from *H. incognita* Pitsch, 1993 for the following characters: the shape of the aedeagus apex, seen laterally, is more elongate and pointed; the aedeagus teeth are less prominent and basally oriented; the thin endotheca is more distally elongated; the smaller basal angle of the aedeagus; throughout its length the straight aedeagus has the same width. The female of *H. incognita* has yet to be described. Pitsch's larval description of *H. incognita* (1993a) is not sufficient for the differentiation from the populations of *H. moretti* from Campania.

The differentiation of *H. dinarica* Marinkovic-Gospodnetic, 1979 from *H. morettii* is not difficult for both larvae and adults.

Acknowledgements

I thank Prof. Giampaolo Moretti (Istituto di Zoologia, Università di Perugia) for having given me good advice for the study of the genus *Hydropsyche* and Dr. Wolfgang Tobias (Senckenberg Museum, Frankfurt am Main) that kindly loaned me some *H. pellucidula* specimen. I also wish to thank Dr. Mara La Rocca for the drawings.

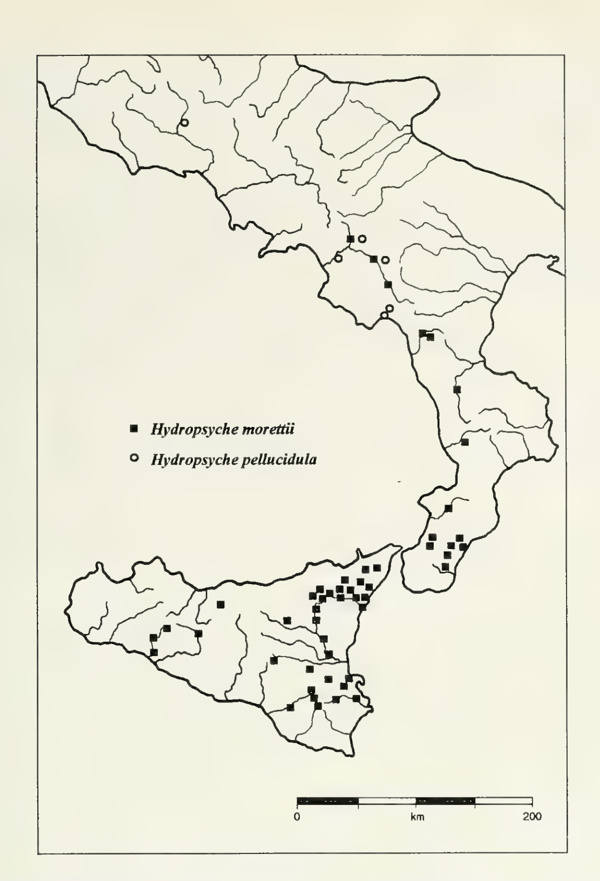


Fig. 30. Collecting sites of *Hydropsyche morettii*, spec. nov. and *H. pellucidula* (Curtis, 1834) in southern Italy.

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14. Greiler, H.-J. : Insektengesellschaften auf selbstbegrünten und eingesäten Ackerbrachen. In: Nentwig, W. & H.-M. Poehling: Agrarökologie 11. - Verlag Paul Haupt, Bern, Stuttgart, Wien, 1993. 136 S.

Diese vergleichende Dokumentation im Rahmen einer Dissertation zeigt einen deutlichen Unterschied in der heute vielfach beobachteten "Grünlandfolgenutzung", nachdem eine extensive oder intensive landwirtschaftliche Nutzung aufgegeben wurde. Der zunächst der Überproduktion entgegenwirkende positive Effekt der Konzeption 'Brache' im Sinne von Naturschutzbestrebungen wird dabei durch gezielte Einsaat oder Begrünung mit "nachwachsenden Rohstoffen" durch Rückkehr zur Monokultur aufgehoben. Die Selbstbegrünung und deren Sukzession über mehrere Jahre an unterschiedlichsten Standorten wird im vorliegenden Fall ebenso wie die begrünten Flächen intensiv vergleichend untersucht. Das Ergebnis, zu dem die Pflanzen- wie auch Tiergesellschaften herangezogen werden, zeigt ein deutliches Bild zugunsten der selbstbegrünten Ackerbrache. Auch die Häufigkeitsverteilungen von Nützlingen wie Schädlingen stehen bei der vergleichenden Studie im Vordergrund. Auch die Wirkungsweise der Mahd auf die Tierwelt wird behandelt, wobei die unterschiedlichsten Reaktionstypen der Wirbellosen auf die Bewirtschaftungsweisen herausgearbeitet werden. Jede Person oder Institution in Naturschutz und Landwirtschaft und Landschaftsplanung, die die Anlage und Bewirtschaftungsweise von Ackerbrachen konzipiert und durchführt wird mit dieser Darstellung Anregungen aber auch Ausrichtungen erfahren. Diese beschleunigen eigene Testreihen und erleichtern die Durchführungen im Sinne einer möglichst optimalen Akzeptanz durch die gesamte naturnahe Biozönose.

E.-G. Burmeister

15. Fortmann, M.: Das Große Kosmosbuch der Nützlinge. Neue Wege der biologischen Schädlingsbekämpfung. - Franckh-Kosmos, Stuttgart, 1993. 318 S. ISBN 3-440-06588-X.

In herausragender Weise zeigt dieses Buch die ungeheure Fülle von Nützlingen, die die Schädlinge - nach der Definition für den menschlichen Vorteil - im Zaume halten. Neben einer Definition und der Beschreibung der komplexen Bedingungen zwischen Räuber, Parasit und Beute, Wirt werden die verschiedensten Gruppen vor allem der Insekten vorgestellt. Dabei wird dem Freiland ein großer Bereich eingeräumt, da dort sicher die sogenannten Gleichgewichte erhalten sind. Besonders erfreulich ist ein dem Erhalt natürlicher Lebensräume zur Schonung und Förderung der Nützlinge gewidmetes Kapitel. Es folgen Einsatzmethoden von Nützlingen im Freiland und 'unter Glas', wobei die derzeit gängigen und bewährten Ausbringungsmethoden von nützlichen Insekten, Raubmilben und Raubnematoden vorgestellt werden. Diese durch besonders informative Bilder gestalteten Kapitel, deren Informationsgehalt zudem von großem Sachverstand des Autors zeugt, sind für jeden Biologen, Gartenbauer, Landwirt und landwirtschaftlich sowie gartenbautechnisch bezogenen Berater von unschätzbarem Wert. Die biologische Schädlingsbekämpfung wird hier ohne die Verklärung ökologischen Denkens oder Besserwisserei als die Alternative zum chemischen Pflanzenschutz vorgestellt. Auch die Darstellung der Helfer im Pflanzenschutz enthält zahllose interessante biologische Details, die das Verständnis um die Zusammenhänge besonders fördern. Auch die biotechnischen Verfahren und die Anwendung mikrobiologischer "Helfer" im Pflanzenschutz werden vorgestellt, wobei diesen glücklicherweise nicht der heute gängige breite Anwendungsraum in diesem Buch gewidmet wird. Ein kleines Kapitel beleuchtet die Anwendung im integrierten Pflanzenschutz, in dem die biologische Schädlingsbekämpfung mehr eine Kontrollfunktion erhält. Die Schlußbetrachtungen beginnen mit einer wohltuenden Kritik an der chemischen Schädlingsbekämpfung, die leider auch heute noch unter dem Motto vielfach von Laien angewandt wird "mehr ist besser und wirksamer". Vor jedem Konflikt mit den Schädlingen an den Nutzpflanzen und der Suche nach einer Lösung sollte dieses Buch zu Rate gezogen werden.

E.-G. Burmeister

16. Waite, E. R.: The Reptiles and Amphibians of South Australia. - Society for the Studies of Amphibia and Reptilia, 1993. 270 S., 192 Abb. ISBN 0-916984-30-3.

Das Buch "The Reptiles and Amphibians of South Australia" wurde zum erstenmal im Jahre 1929 durch das Handbooks Committee of the South Australian Branch of the British Science Guild publiziert. Hier liegt nun ein Faksimile-Band vor. M. J. Tyler und M. Hutchinson, zwei anerkannte australische Herpetologen der Gegenwart, haben das Vorwort geschrieben. Mit subtiler Kenntnis der südaustralischen Herpetofauna und großer eigener Erfahrung hat Edgar R. Waite dieses Werk geschrieben und es mit einer Fülle von Zeichnungen und Fotos illustriert. Inzwischen wurden viele neue Bücher über die Amphibian und Reptilien Australiens veröffentlicht, aber noch heute kann man diesen Band zur Bestimmung einzelner Arten benutzen. Die Bestimmungsschlüssel haben ihre Gültigkeit behalten. Im Text finden sich, neben reinen Merkmalsdaten, viele anregend zu lesende Hinweise auf Vorkommen, Biologie und Verhalten der jeweiligen Art. Besonders hilfreich für den Herpetologen unserer Tage ist gleich zu Anfang eine Gegenüberstellung der wissenschaftlichen Namen, wie sie zu Waites Zeit und heute Gültigkeit hatten und haben. Insgesamt eine bibliographische Delikatesse.

U. Gruber

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Revision of the sawflies described by Lothar Zirngiebl

(Preliminary studies for a catalogue of Symphyta, part 2)*

(Insecta, Hymenoptera, Symphyta)

By **Stephan M. Blank**

Blank, S. M. (1996): Revision of the sawflies described by Lothar Zirngiebl (Insecta, Hymenoptera, Symphyta). – Spixiana **19/2:** 195-219

Lothar Zirngiebl (1902-1973) proposed six new names for genera and subgenera and 64 new names for species and varieties of sawflies. These names and the corresponding types are revised and one new synonym for the genus group and 34 new synonymies for the species group are proposed: *Cimbex* Olivier, 1790 [*Allocimbex* Zirngiebl, 1953, syn. nov.]; *Allantus balteatus* (Klug, 1818) [*Emphytus balteatus* var. *albimaculus* Zirngiebl, 1937, syn. nov.; *E. balteatus* var. *nigrolinearis* Zirngiebl, 1937, syn. nov.]; *Ametastegia equiseti* (Fallén, 1808) [*A. equiseti* var. *stitia* Zirngiebl, 1954, syn. nov.]; *Ametastegia carpini* (Hartig, 1837) [*Emphytus perla* var. *obscurus* Zirngiebl, 1954, syn. nov.]; *Brachythops flavens* (Klug, 1816) [*Selandria flavens* var. *antennalis* Zirngiebl, 1954, syn. nov.; *S. flavens* var. *flavissima* Zirngiebl, 1961, syn. nov.]; *Cimbex americana* Leach, 1817 [*Allocimbex obscura* Zirngiebl, 1953, syn. nov]; *Craesus varus* (Villaret, 1832) [*Croesus varus* var. *hermanni* Zirngiebl, 1954, syn. nov.]; *Dolerus aericeps* (Thomson, 1871) [*D. aericeps* var. *guttatus* Zirngiebl, 1954, syn. nov.]; *Dolerus germanicus* (Fabricius, 1775) [*D. pratensis* var. *major* Zirngiebl, 1954, syn. nov.]; *Elinora longipes* (Konow, 1886) [*Cuneala tricolor* Zirngiebl, 1956, syn. nov]; *Metallus lanceolatus* (Thomson, 1870) [*M. gei* var. *egregius* Zirngiebl, 1963, syn. nov.]; *Nematus similator* Förster, 1854 [*Pteronus eurysternus* var. *struvei* Zirngiebl, 1939, syn. nov.]; *Pontania herbaceae* (Cameron, 1758) [*Pontania enslini* Zirngiebl, 1937, syn. nov.]; *Pristiphora lativentris* (Thomson, 1871) [*Lygaeonematus pallipes* var. *femoralis* Zirngiebl, 1953, syn. nov.]; *Selandria serva* (Fabricius, 1793) [*S. serva* var. *punctata* Zirngiebl, 1956, syn. nov.]; *Tenthredo arcuata* Forster, 1771 [*Allantus arcuatus* var. *similans* Zirngiebl, 1949, syn. nov.]; *Tenthredo arcuata* ssp. *arcuata* Forster, 1771 [*Allantus sulphuripes* var. *selectus* Zirngiebl, 1961, syn. nov.; *A. sulphuripes* var. *tegularis* Zirngiebl, 1949, syn. nov.]; *Tenthredo brevicornis* (Konow, 1886) [*Allantus arcuatus* var. *atricereus* Zirngiebl, 1937, syn. nov.; *A. arcuatus* var. *luteipes* Zirngiebl, 1961, syn. nov.; *A. sulphuripes* var. *schneidi* Zirngiebl, 1949, syn. nov.]; *Tenthredo maculata* ssp. *maculata* Geoffroy, 1785 [*T. maculata* var. *collaris* Zirngiebl, 1940, syn. nov.; *T. maculata* var. *wagneri* Zirngiebl, 1940, syn. nov.]; *Tenthredo maculata* ssp. *diana* Benson, 1968 [*T. maculata* var. *coloris* Zirngiebl, 1940 syn. nov.]; *Tenthredo notha* ssp. *notha* Klug, 1817 [*Allantus arcutus* var. *media* Zirngiebl, 1949, syn. nov.; *A. arcuatus* var. *niger* Zirngiebl, 1937, syn. nov.; *A. sulphuripes* var. *fasciatus* Zirngiebl, 1949, syn. nov.; *A. sulphuripes* var. *fulvus* Zirngiebl, 1949, syn. nov.]; *Tenthredo sulphuripes* ssp. *sulphuripes* (Kriechbaumer, 1869) [*Allantus arcuatus* var. *nigrosulphureus* Zirngiebl, 1937, syn. nov.; *A. arcuatus* var. *sulphureoides* Zirngiebl, 1949, syn. nov.; *A. sulphuripes* var. *maculatus* Zirngiebl, 1949, syn. nov.]; *Tenthredo variabilis* (Mocsary, 1909) [*T. carolinae* Zirngiebl, 1937, syn. nov.]; *Tenthredo velox* Fabricius,1798 [*T. velox* var. *alpina* Zirngiebl,1937, syn. nov.; *T. velox* var. *nigripleuris* Zirngiebl, 1937, syn. nov.]; *Tenthredo vespa* ssp. *vespa* Retzius, 1783 [*Allantus vespa* var. *niger* Zirngiebl, 1954, syn. nov.]. A short biography of Lothar Zirngiebl is presented.

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Fig. 1. The 65 years old Lothar Zirngiebl.

Biography

Lothar Zirngiebl (Fig. 1) was born on October 5th, 1902 in Freising (Germany, Bavaria). He went to school in Munich, Speyer and Ludwigshafen. In his youth he was encouraged by his father, Hermann Zirngiebl, to investigate sawflies. His father, who had worked at the Bavarian Station for Plant Protection and Plant Diseases in Weihenstephan for some time, published a first checklist of the Palatine sawflies in 1924. Zirngiebl took part in World War I as a volunteer, where he was wounded so badly by mustard gas, that he could not study medicine as intended. After two years attendance at teachers training college (1922/23) Zirngiebl became a teacher in Leistadt (Palatinate). In 1936 Zirngiebl got his graduation diploma due to his scientific publications. In World War II he served as a medical officer and a chemo-medical laboratory assistant. From 1949 onwards Zirngiebl taught the pupils of Birkenheide - during the first time after the war in huts - and led the school as the headmaster. Under his direction a new, modern school-house was built in Birkenheide. In 1962 he retired because of his shattered health and lived together with his wife Karla Zirngiebl in Himmelsthür near Hildesheim. After a long period of sickness Lothar Zirngiebl died on July 8th, 1973.

Introduction

The collection of Zirngiebl is housed at the Zoologische Staatssammlung in Munich. The present list summarizes all names, which Zirngiebl published for sawflies, and the available corresponding type material. The correct citations for the names are given and the taxonomic placement of the taxa is discussed. The publications of Zirngiebl were listed by Blank (1989). In an only publication on Vespidae Zirngiebl described five new varieties of Polistinae. Neither the type series nor the taxonomic placement of these taxa was checked within the present investigation. Blüthgen (1956) and J. Gusenleitner (pers. comm.) treat these taxa as colour forms with infrasubspecific rank.

The greater part of Zirngiebl's collection consists of sawfly species, which are (or were) distributed in the surrounding of his residences in the Palatinate (about 49°20'N 8°10'E). Sawflies from the Mediterranean area and Central Asia form the smaller part of the collection. Today Zirngiebl's collection is integrated in the main collection of the Zoologische Staatssammlung. Most type specimens are deposited at this museum, additional ones at the Naturhistorisches Museum, Vienna, at the Staatliches Museum für Naturkunde, Stuttgart, at the Musée Zoologique Cantonal, Lausanne, at the Zoological Museum, Helsinki, and at the Westfälisches Landesmuseum für Naturkunde, Münster.



Fig. 2. Specimens of Zirngiebl's handwritten and printed labels: a. *Cuneala tricolor* Zirngiebl, 1956 (holotype), the holotype label was written by W. Schedl; b. *Pontania kirchneri* Zirngiebl, 1959 (holotype); c. *Tenthredo maculata* var. *coloris* Zirngiebl, 1940 (lectotype), the second label from above is a cabinet label of Zirngiebl's collection.

Often the original descriptions of Zirngiebl's taxa lack data concerning the type locality or the size of the type series. In these cases lectotypes were designated. Here I referred to material from Zirngiebl's own collection at first, then to material from the other collections. Type specimens were examined to see, whether they agree with labelling and morphological characters given in the original description. If the genitalia were investigated, the preparations were subsequently gummed to a small piece of cardboard and pinned on the needle of the type.

Zirngiebl's work gives the impression that the author had no clear concept of the status of species, subspecies and varieties. Zirngiebl tended to describe forms from the Central European area, which were unknown to him, as varieties, whereas he described new forms from more distant localities as species. The term subspecies, as it is interpreted by most present authors, seems to be unknown to him or equivalent to the term variety, because Zirngiebl never described "ssp.". The labelling of the holotype of "Emphytus basalis var. masculus ssp. n. det. Zirngiebl" may show, how confused Zirngiebl's taxonomic concept was. Today in most cases it is impossible to verify, whether the author really meant subspecific or infrasubspecific rank. For that reason varietal names were reduced to infrasubspecific rank only in few evident or advisable cases. For the remaining varieties holotypes were labelled or lectotypes were fixed, and the validity of the taxa was checked.

Genus-group taxa

Zirngiebl (1930: 274-279) subdivided the tribe Dolerini [sic!] into three "Untergattungen" ['subgenera', translated from Zirngiebl 1930]: Hamatodentiden, Multidentiden and Nodulodentiden. In this connection Zirngiebl used "Untergattung" as a morphological and not a taxonomic term. This is indicated by the fact that Zirngiebl grouped specimens of both *Dolerus* Panzer, 1801, and *Loderus* Konow, 1890, as Hamatodentiden (p. 276). However, on page 280-281 of this publication, and in all

preceding and later publications Zirngiebl mentioned these two genera as seperate ones.

Zoological nomenclature is only applied to taxonomic units. Therefore the names Hamatodentiden, Multidentiden and Nodulodentiden are excluded from the provisions of the Code and not available (Art. 1 a, ICZN 1985).

Allocimbex Zirngiebl, 1953, syn. nov.

Zirngiebl, 1953. Mitt. Münch. ent. Ges., München 43: 234-235. Type species: *Allocimbex obscura* Zirngiebl, 1953 [= *Cimbex americana* Leach, 1817], designation by monotypy.

Taxonomic placement: *Cimbex* Olivier, 1790 (Cimbicidae).

Discussion: Zirngiebl mentions the claws lacking a subapical tooth as a prominent character of *Allocimbex*. The holotype of *A. obscura* just as each further male *C. americana* I have seen so far lacks this subapical tooth. *Allocimbex* is synonymous with *Cimbex* Olivier, 1790, due to the synonymy of *A. obscura* with *C. americana*.

Brachyocampa Zirngiebl, 1956

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 323-325. Type species: *Eriocampa dorpatica* Konow, 1887, designation by monotypy (subgenus of *Eriocampa* Hartig, 1837).

Taxonomic placement: *Eriocampa* Hartig, 1837 (Tenthredinidae).

Discussion: According to Taeger (1986) the position of the cross vein in the anal cell of *Eriocampa dorpatica* is variable and thus not suitable for the characterization of a subgenus. Zirngiebl mentions a short saw sheath as a character of *E. dorpatica*. In comparison with *E. ovata* (Linné, 1761) the ovipositor of *E. dorpatica* is not shorter.

Cuneala Zirngiebl, 1956

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 322, 325. Type species: *Cuneala tricolor* Zirngiebl, 1956 [= *Elinora longipes* (Konow, 1886)], designation by monotypy.

Taxonomic placement: *Elinora* Benson, 1946 (Tenthredinidae).

Discussion: According to Zhelochovtsev (1976, 1988) and Taeger (1991) *Cuneala* is identical with genus *Elinora*. The type species of *Cuneala*, *C. tricolor*, agrees with *Elinora longipes* (cf. discussion under *C. tricolor*).

Eurogaster Zirngiebl, 1953

Zirngiebl, 1953. Mitt. Münch. ent. Ges., München 43: 236. Type species: *Sciapteryx arctica* (Kiaer, 1898) [= *T. microps* (Konow, 1903)], by original designation.

Taxonomic placement: *Tenthredo* subgen. *Eurogaster* Zirngiebl, 1953 (Tenthredinidae).

Discussion: Zirngiebl mixed up several species in his genus *Eurogaster*, which are placed in *Tenthredo* subgen. *Eurogaster* (= *T. mesomela*-group), in the *Tenthredo arcuata*-group and in the *Rhogogaster picta*-group today.

Describing *Eurogaster*, Zirngiebl (1953) referred to a distinct couple of *Sciapteryx arctica* Kiaer [= *T. microps* (Konow, 1903)], which he received from W. Hellén. Zirngiebl retained one female specimen for his own collection. This specimen of *T. microps* is labelled as following: "Fennia Utsjoki Outakoski 26.6.1947 leg. Hellén"; [Hellén's handwriting:] "*Sciapteryx arctica* Kiaer Hellén det."; [cabinet label, Zirngiebl's handwriting:] "*Eurogaster arctica* Kiaer". *S. arctica* (Kiaer, 1898) is the type species of *Eurogaster*. Zhelochovtsev (1976, 1988) and Taeger (1992) use *Eurogaster* as a subgenus of *Tenthredo* Linnaeus, 1758, for the former *T.-mesomela*-group. In the context of the original description Zirngiebl

(1953) discussed, whether *R. picta* has to be treated as a member of this genus, too. Later Zirngiebl (1954) erronously treated "*Eurogaster* (*Rhogogaster*) *picta*" as the type species of *Eurogaster*, although he had fixed *S. arctica* Kiaer as the type species. Today *picta* (Klug, 1817) is treated as a member of the *Rhogogaster picta*-group (Benson 1947, 1952, Taeger 1992). Zirngiebl (1953) also mentioned a female specimen of "*Eniscia arctica* C. G. Thom." [= *Tenthredo arctica* (Thomson, 1870)] which was collected in Central Asia by Zugmayer in 1906. This species is not a member of *Tenthredo* subgen. *Eurogaster*. Probably *T. arctica* (Thomson) is a species of the *Tenthredo arcuata-schaefferi*-group.

Pseudocephaleia Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 339-340. Type species: *Pseudocephaleia brachycerus* Zirngiebl, 1937 [= *P. praeteritorum* (Semenov, 1934)], designation by monotypy.
Taxonomic placement: *Pseudocephaleia* Zirngiebl, 1937 (Pamphiliidae).

Discussion: *Pseudocephaleia* is a valid genus, which contains two species: *P. praeteritorum* (Semenov, 1934) and *P. zuvandica* Ermolenko, 1993 (Achterberg & Aartsen 1986, Ermolenko 1993).

Selandropha Zirngiebl, 1956

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 322. Type species: *Selandria stramineipes* (Klug, 1816) [= *Aneugmneus padi* (Linné, 1761)], by original designation (subgenus of *Selandria* Leach, 1817).
Taxonomic placement: *Aneugmenus* Hartig, 1837 (Tenthredinidae).

Discussion: Zirngiebl (1956) placed the following species in his new subgenus: "*S. stramineipes* Klg. [= *Aneugmenus padi* (Linné, 1761)], *temporalis* C. G. Th., *morio* F. und vielleicht auch ['and perhaps also'] *fuerstenbergensis* Knw. [...] (Typ = *Sel. stramineipes* Klg.)". In the original description Hartig (1837) mentioned *A. coronatus* (Klug, 1818) as the only species of *Aneugmenus*. Today the species *padi* and *temporalis* also belong to *Aneugmenus*, *morio* is a species of *Nesoselandria* Rohwer, 1910 [= *Melisandra* Benson, 1939] and *fuerstenbergensis* a species of *Atoposelandria* Enslin, 1913 [= ?*Aneugmenus*]. The synonymy of *Selandropha* with *Aneugmenus* proposed by Zombori (1981) is correct.

Species-group taxa

Acantholyda parvula Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 340-342, ♀, loc. typ.: Lower Austria, ?Prater.
Taxonomic placement: *Acantholyda laricis* (Giraud, 1861).

Holotype: ♀, Niederösterreich [= Lower Austria], ?Prater, leg. Michel.
Deposition according to Zirngiebl (1937): Naturhistorisches Museum, Vienna.
Discussion: The holotype could not be found. Achterberg and Aartsen (1986) who synonymized *A. parvula* with *A. laricis*, have already supposed that the type specimen is lost.

Allantus antigae var. *atroscutellatus* Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 346, ♀, loc. typ.: Spain, Cordoba.
Taxonomic placement: *Elinora baetica* (Spinola, 1843).

Lectotype (hereby designated): ♀, "Hispania, Cordoba"; "*Allantus contiguus* Kon.?"; "*A. antigae* Knw. var. nov. *atroscutellata*, det. Zirngiebl"; "*Elinora baetica* ♀ Dét. J. Lacourt"; [red:] "Lectotypus ♀ *Allantus antigae* var. *atroscutellatus* Zirngiebl, 1937 des. S. M. Blank 1993". The lectotype is in good condition.
Paralectotypes: Two further ♀♀ from Cordoba, 3♀♀ from Utrera.
Deposition: Lectotype in Zoologische Staatssammlung, Munich, paralectotypes in Zoologische

Staatssammlung, Munich, and Naturhistorisches Museum, Vienna.
Discussion: According to Lacourt (1991), who investigated part of the type series, the taxon is identical with *Elinora baetica.*

Allantus arcuatus var. *atricereus* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 345, ♂, loc. typ.: Germany, Speyer.
Allantus arcuatus var. *atricerus* Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 346, err. typ.
Taxonomic placement: *Tenthredo brevicornis* (Konow, 1886).

Lectotype (hereby designated): ♂, "Speyer, V.21"; [red:] "Lectotypus ♂ *Allantus arcuatus* var. *atricereus* Zirngiebl 1937 des. S. M. BLANK 1993"; "*Tenthredo brevicornis* (Knw.) det. S. M. Blank '91". The lectotype is in good condition.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: When establishing the new variety, Zirngiebl used the name *atricereus* (p. 345), on the following page and in a subsequent publication (1954: 131) the incorrect spelling "*atricerus*" (err. typ.). Zirngiebl (1954) used "*atricerus*" in connection with *T. sulphuripes* (Kriechbaumer, 1869), too. The single male specimen can be assigned to *T. brevicornis* (Konow, 1886).

Allantus arcuatus var. *luteipes* Zirngiebl, 1961, syn. nov.

Zirngiebl, 1961. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 8: 186, ♀, loc. typ.: Germany, Birkenheide. Infrasubspecific name according to Art. 16 and 45 f ICZN (1985).
Taxonomic placement: *Tenthredo brevicornis* (Konow, 1886).

"Type": ♀, "Birkenheide Pfalz 25.5.1955 coll. Zirngiebl"; "*Allantus arcuatus* v. *melanoxyston* Ensl. aber: Beine fast ganz gelb"; "*Allantus arcuatus* v. *luteipes* Zrg"; "'Typus' ♀ *Allantus arcuatus* var. *luteipes* Zirng. 1961 teste S. M. Blank 1993, infrasubspezifischer Name!"; "*Tenthredo brevicornis* Knw. ♀ det. Blank '89".
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The name "var. *luteipes* Zirngiebl, 1961" is not available, because it was described as a variety after 1960 (Art. 16 and 45 f ICZN 1985). The "type" specimen agrees with *Tenthredo brevicornis.*

Allantus arcuatus var. *media* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♂, loc. typ.: Germany, Starnberg.
Taxonomic placement: *Tenthredo notha* ssp. *notha* Klug, 1817.

Lectotype (hereby designated): ♂, "Starnberg a. See Stöcklein 21.7.38"; [red:] "Lectotypus ♂ *Allantus arcuatus* var. *media* Zirngiebl, 1949 des. S. M. BLANK 93"; "*Tenthredo n. notha* Klug ♂ det. Blank". The lectotype is in good condition.
Paralectotypes: 2♂♂ from the same locality as the lectotype.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: *A. arcuatus* var. *media* represents a very dark coloured form of *T. notha* ssp. *notha.*

Allantus arcuatus var. *niger* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 345-346, ♂, loc. typ.: Lower Austria, Gass.
Taxonomic placement: *Tenthredo notha* ssp. *notha* Klug, 1817.

Lectotype (hereby designated): ♂, "1.8.04, Gass"; "*Allantus arcuatus* var. nov. *niger*, det. Zirngiebl"; [red:] "Lectotypus ♂ *Allantus arcuatus* var. *niger* Zirngiebl, det. Blank 1991"; "*Tenthredo notha notha* Klug ♂, det. Blank '89". The lectotype is in good condition.
Deposition: Naturhistorisches Museum, Vienna.
Discussion: The locus typicus "Niederösterreich" (Zirngiebl 1937) cannot be drawn from the labelling of the lectotype. Despite that fact the single male specimen is hereby designated as the lectotype, because it agrees with the characters given in the original description and because of its labelling as "var. nov.". The single male specimen represents *Tenthredo notha* ssp. *notha.*

Allantus arcuatus var. *nigrosulphureus* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 345-346, ♀, loc. typ.: Lower Austia, Goggendorf. Taxonomic placement: *Tenthredo sulphuripes* ssp. *sulphuripes* (Kriechbaumer, 1869).

Lectotype (hereby designated): ♀, "Austria inf., R Goggendorf, 13.8.16, Zerny"; "*A. arcuatus* var. nov. *nigrosulphureus*, det. Zirngiebl"; [red:] "Holotype ♀ *Allantus arcuatus* var. *nigrosulphureus* Zirngiebl 1937 det. S. M. Blank 1991"; "*Tenthredo sulphuripes* (Krbm.) ♀ det. Blank 1988, melanist. Form". The type specimen is in good condition.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: Zirngiebl related this form to the colour varieties of *sulphuripes* and described *nigrosulphureus* due to the peculiar body colouration. The specimen represents a melanistic form of *T. sulphuripes* ssp. *sulphuripes*. Contrary to the dark coloured *T. sulphuripes*, which has been reported by Taeger (1984), this female specimen possesses yellow scapi and scutellum. The light colouration of the abdomen is reduced to a large yellow band on the first tergite, a very small one on the fifth, and small lateral spots on 2.-4. and 6. tergites. The 7. and 8. tergites are coloured yellow medially. The yellow stripe on the mesepisternum is missing. The posterior femora have each a small apical brownish spot.

Allantus arcuatus var. *similans* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 285, 290, ♀, loc. typ.: Iran, Elburs-Mountains, Tanakarud.

Taxonomic placement: *Tenthredo arcuata* Forster, 1771.

Lectotype (hereby designated): ♀, "Tacht i Suleiman Särdab-Tal (Tanakarud) 29-3200m 19.-23.7.37 E. Pfeiffer & W. Forster"; "Persia sept. Elburs mts. c. s."; [handwriting of Külhorn:] "*Tenthredo arcuata* v. *similans* Zirng. ♀ det. Zirng. Staatssamml. München"; "*Tenthredo schaefferi* f. *perkinsi* ♀ det. R. B. Benson 1956"; [red:] "Lectotypus ♀ *Allantus arcuatus* var. *similans* Zirngiebl 1949 des. S. M. Blank (1991)"; "*Tenthredo arcuata similans* Zrng. ♀ det. Blank 91". The lectotype is in good condition.

Paralectotypes: 4♀♀ from the same locality and from Hecercal (3500 m NN).

Deposition: Zoologische Staatssammlung, Munich.

Discussion: *A. arcuatus* var. *similans* represents a dark form of *Tenthredo arcuata*. Scapus, pedicellus and the greater part of the tegulae are completely black, the scutellum is yellow on the anterior half, the light lateral abdominal stripe is interrupted on the anterior sides of the tergites 1-3 (1-7) with black. Body length 10.7-11.8 mm, minimum ventro-ocular distance 0.35-0.4 times as long as the distance between the antennal sockets, upper side of head shining between scattered punctures, longest setae on upper side of the head 1.4-1.7 times as long as diameter of the frontal ocellus [1.3-1.6 in *T. arcuata* ssp. *arcuata*, 1.4-2.0 in *T. arcuata* ssp. *korabica* (Csiki, 1922)], praescutum rugose medially between fine punctures, hypopygium excised as shown in fig. 37 by Taeger (1985).

Morphologically *A. arcuatus* var. *similans* looks rather similar to Central European specimens of *T. arcuata* ssp. *arcuata*. There is a large variation in colour and in morphological characters among *Tenthredo arcuata* s. l. specimens from Turkey, Caucasus Mountains and Iran (cf. Taeger 1988). At the moment it is impossible to decide, whether *A. arcuatus* var. *similans* (just as *T. arcuata* ssp. *korabica*!) is a modification of *T. arcuata* ssp. *arcuata* or a valid subspecies. Benson (1959), who investigated at least one syntype, cites specimens from the type locality as *T. schaefferi* forma *perkinsi* (Morice, 1919) [= *T. notha* ssp. *notha*].

Allantus arcuatus var. *sulphureoides* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♂, loc. typ.: Germany, Würzburg. Taxonomic placement: *Tenthredo sulphuripes* ssp. *sulphuripes* (Kriechbaumer, 1869).

Holotype: ♂, Würzburg, leg. Zwecker.

Discussion: The holotype of *A. arcuatus* var. *sulphureoides* is probably lost. The characterization of *sulphureoides* in a key by Zirngiebl (1949) corresponds well with the description of melanic specimens of *T. sulphuripes* by Taeger (1984).

Allantus costatus var. *obscurus* Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 347, ♀♂, loc. typ.: Serbia, Vitkovac. Preoccupied in *Tenthredo* by Gmelin, 1790 [= *T. atra* Linné, 1758].

Taxonomic placement: *Tenthredo costata* Klug, 1817.

Lectotype (hereby designated): ♀, "Vitkovac Serbien"; "Type Coll. L. Zirngiebl"; [red:] "Lectotypus ♀ *Allantus costatus* var. *obscurus* Zirngiebl 1937 des. S. M. Blank (1991)"; "*Tenthredo costata* Klug, 1814♀ det. Blank '91". The type specimen is in good condition.

Paralectotypes: 2♀♀, 1♂, from Vitkovac (Serbia) and Herkulesbad.

Deposition: Lectotype in Zoologische Staatssammlung, Munich, Paralectotypes in Zoologische Staatssammlung, Munich, and Naturhistorisches Museum, Vienna.

Discussion: Among the collection of Zirngiebl there are 3♀♀ and 1♂ *T. costata* from Vitkovac and Herkulesbad. One female specimen, which has been designated as the lectotype of *A. costatus* var. *obscurus*, fits roughly with the description, because its pronotum bears only two tiny yellow spots. The paralectotypes have more extensively yellow pronota (cf. Taeger 1984). *A. costatus* var. *obscurus* was synonymised with *T. costata* by Taeger (1984).

Allantus marginellus var. *melanomerus* Zirngiebl, 1942

Zirngiebl, 1942. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 2, 10: 100, ♀, loc. typ.: Germany, Landau.

Taxonomic placement: *Tenthredo marginella* ssp. *marginella* Fabricius, 1793.

Lectotype (hereby designated): ♀, "Landau-Pfalz am 8.VIII.38 Coll. Zirngiebl"; "*marginellus* var. *melanomerus* Zrg."; [red:] "Lectotypus ♀ *Allantus marginellus* var. *melanomerus* Zirngiebl 1942 des. S. M. Blank (1991)"; "*Tenthredo marginella* F. ♀ det. Blank". The tarsus of the right hind leg is missing.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: According to Taeger (1988) *A. marginellus* var. *melanomerus* is a junior synonym of *T. marginella*. The taxon is not homonymous with *A. omissa* var. *melanomeros* Enslin, 1912 [= *T. omissa* (Förster, 1844)].

Allantus marginellus var. *nigroscutellatus* Zirngiebl, 1942

Zirngiebl, 1942. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 2, 10: 100, ?♀♂, loc. typ.: ? Germany.

Allantus marginellus var. *nigroscutellaris* Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 130, nomen nudum.

Taxonomic placement: *Tenthredo marginella* ssp. *marginella* Fabricius, 1793.

Discussion: Zirngiebl characterized *A. marginellus* var. *nigroscutellatus* by the black scutellum and the yellow marked mesepisterna. No type specimen could be found for this taxon. Taeger (1988) synonymised *A. marginellus* var. *nigroscutellatus* and *Tenthredo marginella* ssp. *marginella*. He examined one female specimen, which has been labelled as the type by Zirngiebl, but which was collected in 1944, two years after the description of the taxon. In the original description data concerning the type locality and the size of the type series are missing. Zirngiebl (1954) cited *A. marginellus* var. *nigroscutellaris* which he characterized by a completely black scutellum, too. No type specimen could be found. Probably this name is a type error of *A. marginellus* var. *nigroscutellatus*.

Allantus sulphuripes var. *fasciatus* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♂, loc. typ.: Germany, Landau. Preoccupied in *Tenthredo* by Scopoli, 1763 [= *Tenthredo zonula* Klug, 1817].

Taxonomic placement: *Tenthredo notha* ssp. *notha* Klug, 1817.

Lectotype (hereby designated): ♂, "Landau-Pfalz am 5.VIII.39 Coll. Zirngiebl"; "*Allantus arcuatus* oder *sulphuripes* [...] var. nov. *fasciatus*"; [red:] "Lectotypus ♂ *Allantus sulphuripes* var. *fasciatus* Zirngiebl, 1949 des. S. M. BLANK 1993"; "*Tenthredo n. notha* Kl. ♂ det. Blank '89". The greater part of the legs and the antenna of the right body side are missing.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The single specimen represents an abnormally light- coloured male specimen of *T. notha* ssp. *notha* Klug, 1817, with even terga 3-5 completely yellow.

Allantus sulphuripes var. *fulvus* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♂, loc. typ.: Austria, Lassee. Preoccupied in *Tenthredo* by Retzius, 1783 [= *Pamphilius betulae* (Linné, 1758)].

Taxonomic placement: *Tenthredo notha* ssp. *notha* Klug, 1817.

Lectotype (hereby designated): ♂, "Austria inf. R Lassee 25.8.16 Zerny"; "1338"; "Gruppe: *sulphurip.* form: *fulvus*"; [red:] "Lectotypus ♂ *Allantus sulphuripes* var. *fulvus* Zirngiebl, 1949 des. S. M. BLANK 1993"; "*Tenthredo n. notha* (Klug) ♂ det. Blank '89". The lectotype is in good condition.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The legs of *A. sulphuripes* var. *fulvus* are extremly light coloured. The single specimen represents *T. notha* ssp. *notha* and not *T. schaefferi* (Klug, 1814) because of the body length (9,4 mm) and the light coloured tegulae.

Allantus sulphuripes var. *maculatus* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♀, loc. typ.: Germany, Leistadt-Dürkheim. Preoccupied in *Tenthredo* by Geoffroy, 1785 [= *T. maculata*].

Taxonomic placement: *Tenthredo sulphuripes* ssp. *sulphuripes* (Kriechbaumer, 1869).

Lectotype (hereby designated): ♀, "Leistadt-Dürkheim am Coll. L. Zirngiebl"; [red:] "Lectotypus ♀ *Allantus sulphuripes* var. *maculatus* Zirngiebl, 1949 des. S. M. BLANK 93"; "*Tenthredo sulphuripes* (Krbm.) ♀ det. Blank". The lectotype is in good condition.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: Zirngiebl described *A. sulphuripes* var. *maculatus* because of the yellow-marked side lobes of the mesonotum. According to Taeger (1984) this colouration occurs now and then in *T. sulphuripes*.

Allantus sulphuripes var. *schneidi* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 287-290, ♀, loc. typ.: Germany, Bamberg-Ebing.

Taxonomic placement: *Tenthredo brevicornis* (Konow, 1886).

Lectotype (hereby designated): ♀, "Bamberg Ebing 17.7.35 Schneid"; [red:] "Lectotypus ♀ *Allantus sulphureipes* var. *schneidi* Zirngiebl 1949 des. S. M. Blank (1991)"; "*Tenthredo brevicornis* Knw. det. Blank '89". The lectotype is in good condition.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: On page 287 Zirngiebl (1949) described three new varieties in one sentence. In this context the gender of the type specimen of *A. sulpuripes* var. *schneidi* remains unclear, because the description of the new taxon is very short. The following remark "auch 1♂" ['also 1♂'; translated from Zirngiebl 1949] is related to var. *fulvus*, not to var. *schneidi*. Besides the lectotype from Bamberg three more female specimens from Leistadt, Landau and Ebermannstadt are preserved in the collection of Zirngiebl which all resemble *T. brevicornis*. The female specimen from Bamberg was designated as the lectotype, because it is the only one that was collected by Schneid. *A. sulphuripes* var. *schneidi* corresponds well with *T. brevicornis*.

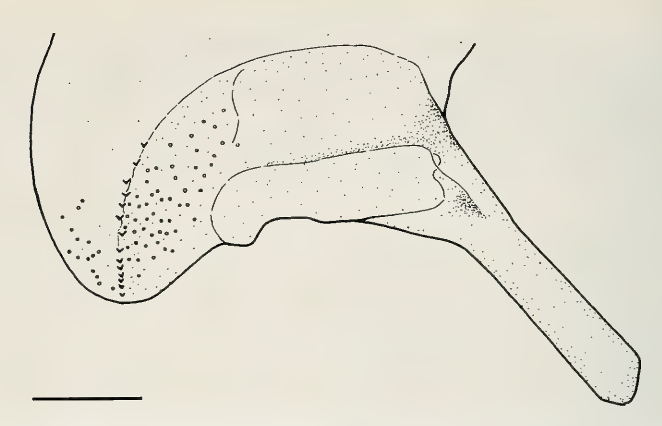


Fig. 3. Penis valve of *Allocimbex obscura* Zirngiebl, 1953 (holotype) [=*Cimbex americana* Leach, 1817]. The penis valve was drawn from the remaining parts of the destroyed genitalia. The dorsal part of the valve is lost. Bar = 300 µm.

Allantus sulphuripes var. *selectus* Zirngiebl, 1961, syn. nov.

Zirngiebl, 1961. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 8: 186, ♂. Infrasubspecific name according to Art. 16 and 45f ICZN (1985).
Taxonomic placement: *Tenthredo arcuata* ssp. *arcuata* Forster, 1771.

"Type": 1♂, from Landau.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The name var. *selectus* is not available, because it was described as a variety after 1960 (Art. 16 and 45 f ICZN 1985). The "type" specimen agrees with *T. arcuata* ssp. *arcuata.*

Allantus sulphuripes var. *tegularis* Zirngiebl, 1949, syn. nov.

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 289, ♂, loc. typ.: Ratzes.
Taxonomic placement: *Tenthredo arcuata* ssp. *arcuata* Forster, 1771.

Lectotype (hereby designated): ♂, "Ratzes Kohl"; [red:] "Lectotypus ♂ *Allantus sulphureipes* var. *tegularis* Zirngiebl 1949 des. S. M. Blank (1991)"; "*Tenthredo arcuata* Forster det. Blank 91". The lectotype is in good condition.
Paralectotype: 1♂ from "Piora VI.04 Fischer".
Deposition: Zoologische Staatssammlung, Munich.
Discussion: *A. sulpuripes* var. *tegularis* represents a very dark form of *T. arcuata* ssp. *arcuata.* The paralectotype probably represents *T. arcuata korabica* (Csiki, 1923).

Allantus vespa var. *niger* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 130, ♂, loc. typ.: Germany, Baden. Preoccupied in *Allantus* Jurine, 1801, by Zirngiebl, 1937 [= *Tenthredo notha* ssp. *notha* Klug, 1817].
Taxonomic placement: *Tenthredo vespa* Retzius, 1783.

Holotype: ♂, "Baden, 12. Aug. 92" (Alfken, 1937).
Discussion: Alfken (1937) cites an "*Allantus vespa* var. *niger* Zirng." (nomen nudum). Zirngiebl (1954) refers to Alfken and describes the taxon shortly: "mit Verdunkelungen an Antennen und Thorax" ['with darkened antenna and thorax'; translated from Zirngiebl 1954]. Type specimens *A. vespa* var. *niger* could not be found. According to Taeger (1988) *A. vespa* var. *niger* is probably a synonym of the variably coloured *T. vespa.*

Allocimbex obscura Zirngiebl, 1953, syn. nov.

Zirngiebl, 1953. Mitt. Münch. ent. Ges., München 43: 234-235, ♂, loc. typ.: unknown.
Taxonomic placement: *Cimbex americana* Leach, 1817.

Holotype: ♂, "Sammlung A. Förster"; "*Cimbex* sp. n. ♂ E. Clément det."; "*Allocimbex* n. gen. *obscura* n. sp. Det. Zirng."; [red:] "Holotypus ♂ *Allocimbex obscura* Zirngiebl 1953 det. S. M. Blank (1991)"; "*Cimbex americana* Leach ♂ det. S. M. Blank 94". The holotype is in bad condition. The following parts of the holotype are missing: left flagellum, anterior tarsi, two apical segments of the left median tarsus, apical four segments of both hind tarsi, parts of the right anterior wing, parts of the genitalia.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: *A. obscura* is synonymous with *C. americana* which is a widespread species in northern America (cf. discussion under *Allocimbex*). Probably Förster received this specimen, when he exchanged material with Ashmead. The reconstruction of the penis valve drawn from the remaining parts is shown in figure 3.

Amasis obscura var. *adusta* Zirngiebl, 1953

Zirngiebl, 1953. Mitt. Münch. ent. Ges., München 43: 235, ♀, loc. typ.: Spain, Baños.
Taxonomic placement: *Corynis* spec.

Holotype: ♀, "Baños VI-07 Dusmet"; "Sammlung Dr. Enslin"; "*Amasis* n. sp. ♀ Dr. Enslin det."; "Flügel stark verdunkelt"; "*Amasis obscurus* v. *adustus* Zg. ♀"; [red:] "Holotype ♀ *Amasis obscura* var. *adusta* Zirngiebl 1953 det. Blank (1989)". The right anterior tibia and tarsus are missing.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: Presently *A. obscura* var. *adusta* can neither be assigned to a valid species of *Corynis* Thunberg, 1789, nor its validity can be confirmed.

Amauronematus maidli Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 336-337, ♀, loc. typ.: Kroatia, Istria.
Taxonomic placement: ?*Pontania* spec.

Holotype: ♀, "Istrien, coll. Graeffe"; "*Amauronem. maidli* Type ♀ O. Conde det. 1939 berichtigt!"; "*Nematus anomalopterus* Först. O. Conde det. 1939"; "*Amauronematus minutus* nov. spec. det. Zirngiebl"; [red:] "Holotypus ♀ *Amauronematus maidli* Zirngiebl det. S. M. Blank '89". The flagella of both antennae are missing.
Deposition: Naturhistorisches Museum, Vienna.
Discussion: The holotype disagrees with the original description in having a clypeus, which is trapeziformly excised at about one third of its length. Conde never published the synonymy of *A. maidli* with *Nematus anomalopterus* Förster, 1854. Muche (1975) treats *A. maidli* as a valid species, but probably he never investigated the type specimen itself. Zirngiebl did not publish "*Amauronematus minutus*", the name is a nomen in litteris. Probably the species belongs to *Pontania* Costa, 1852.

Ametastegia equiseti var. *stitia* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 183, loc. typ.: probably Germany, Palatinate.
Taxonomic placement: *Ametastegia equiseti* (Fallén, 1808).

Discussion: The original description is missing data concerning type locality, gender of the type specimen(s) and size of the type series. No type specimens of *A. equiseti* var. *stitia* could be found. Zirngiebl described this variety from one or several specimens, whose radial cross vein and third cubital cross vein meet at the same point on the radius. Such specimens frequently occur among series of *A. equiseti*.

Aprosthema melanopyga Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 344, ♂, loc. typ.: China, Nanking.
Taxonomic placement: *Aprosthema melanopyga* Zirngiebl, 1937.

Holotype: ♂, "Nanking Dr. Jettner III-IV.1931"; "*Aprosthema melanopyga* n. sp. (mihi) det. Zirngiebl"; [red:] "Holotypus ♂ *Aprosthema melanopyga* Zirngiebl det. S. M. Blank (1989)". Two tarsomeres of the right median leg are missing.
Deposition: Naturhistorisches Museum, Vienna.
Discussion: *A. melanopyga* is characterized as follows: posterior tibiae without subapical spurs, tarsal claws simple, costal cross vein distinct, cubital cross veins indistinct, the second cubital cell much longer than the third. Fig. 4 shows the wings of the right body side. In Malaise's key (1941) *A. melanopyga* runs to *Copidoceros* Forsius, 1921 [= *Aprosthema* Konow, 1899, according to Abe and Smith 1991]. In contrast to Malaise's characterization of *Copidoceros* the antenna of the holotype are longer than the greatest width of the head.
Aprosthema contains numerous taxa whose status is still open. Therefore a decision about the status of both *A. melanopyga* and *A. pachycephala* shall be left to an indispensable revision of *Aprosthema*.

Aprosthema pachycephala Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 352-355, ♀, loc. typ.: Germany, Ruchheim.
Taxonomic placement: *Aprosthema pachycephala* Zirngiebl, 1937.

Holotype: ♀, "Type Coll. L. Zirngiebl"; "Ruchheim-Pfalz den VI.28 Coll. Zirngiebl"; "*Aprosthema pachycephala* mihi!"; [red:] "Holotypus ♀ *Aprosthema pachycephala* Zirngiebl 1937 det. S. M. Blank (1989)". The right hind tarsus is missing.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: cf. *A. melanopyga*.

Croesus varus var. *hermanni* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 165, ♀, loc. typ.: Germany, Landau. Infrasubspecific name according Art. 45 g ICZN (1985).
Taxonomic placement: *Craesus alniastri* (Scharfenberg, 1805).

"Type": ♀, "Landau-Pfalz am 21.VI.31 Coll. Zirngiebl"; "F1 ex L. Zucht Nr. 172 Coll. Zirngiebl"; "Type Coll. L. Zirngiebl"; [red:] "Keine Type! Name nicht verfügbar! S. M. Blank '92"; "*Croesus varus* (Villaret) ♀ det. Blank '91".
Deposition: Zoologische Staatssammlung, Munich.
Discussion: 'The specimen derived from a rearing of many hundred larvae' (translated from Zirngiebl 1954), according to the label from the F1-generation. In contrast to the rest of the reared *C. varus*, Zirngiebl described this single female specimen because of its lighter colouration and the aberrant veins in the anterior wing. The name *Croesus varus* var. *hermanni* is of infrasubspecific rank (Art. 45 g ICZN 1985). *C. varus* is a junior synonym of *C. alniastri* (Scharfenberg, 1805) (cf. Taeger & Blank 1996, in press).

Cuneala tricolor Zirngiebl, 1956, syn. nov.

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 322-325, ♀, loc. typ.: Iran, Rescht, Tahergourabe. Preoccupied in *Elinora* by Kriechbaumer, 1869 [= *Elinora algeriensis* (Magretti, 1886)].
Taxonomic placement: *Elinora longipes* (Konow, 1886).

Holotype: ♀, "Iran (Recht) Tahergourabe (feucht) 0 m 14.4.1950 F. Schäuffele leg."; "?*Allantus* spec. Det. Zirngiebl 1955 (Cuneala tricolor m.)"; "*Tenthredo (Cuneala) longipes* Konow determ. Muche 1983"; "Pr.Nr. 394 fec. W. Schedl 87"; [red, Schedl teste:] "Holotypus ♀ *Cuneala tricolor* Zirngiebl"; "*Tenthredo (Elinora) longipes* Konow ♀ det. S. M. Blank 91". The right posterior tarsus is missing two apical segments, one half of the saw is imbedded on a slide (prep.-nr. 394, fec. Schedl 1987).
Deposition: Staatliches Museum für Naturkunde, Stuttgart.

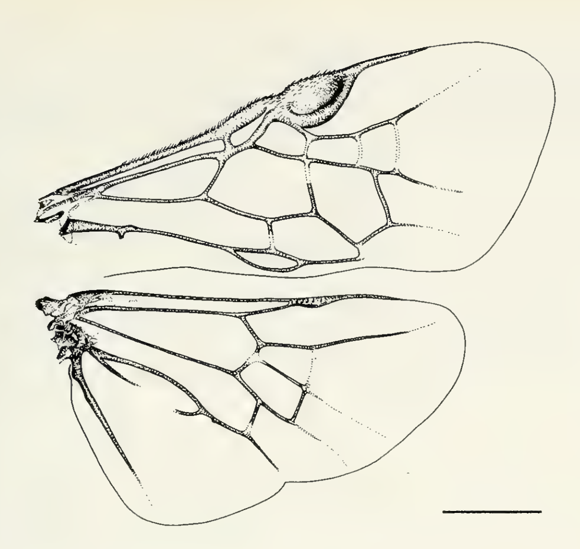


Fig. 4. Wings of *Aprosthema melanopyga* Zirngiebl, 1937 (holotype). Bar = 1 mm.

Discussion: Taeger (1988, 1991) supposed that *C. tricolor* Zirngiebl, 1956 and *Elinora radoszkowskii* (André, 1881) are synonymous, but the holotype fits the description of *Cuneala longipes* (Konow, 1886) in Benson (1968) [Taeger teste, 1993]. The clypeus is pyramidially deformed in the middle ("prismenförmig"/ 'prismatically' according to Zirngiebl 1956) and somewhat assymetric. The labelling of the holotype is shown in fig. 2a.

Dolerus aericeps var. *guttatus* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 139, ♀, loc. typ.: Germany, Speyer.

Taxonomic placement: *Dolerus aericeps* Thomson, 1871.

Lectotype (hereby designated): ♀, "Speyer VIII.20"; "Type coll. L. Zirngiebl"; [red:] "Lectotypus ♀ *Dolerus aericeps* var. *guttatus* Zirng. 1954 des. S. M. Blank '89"; "*Dolerus aericeps* Thom. ♀ det. Blank". The type is in good condition.

Paralectotypes: 4♀♀ from Landau, Leistadt and Birkenheide. One female specimen from this series was designated as a paratype by Zirngiebl.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: *Dolerus aericeps* var. *guttatus* is a melanic form of *Dolerus aericeps.*

Dolerus frontalis Zirngiebl, 1930

Zirngiebl, 1930. Mitt. pfälz. Ver. Naturk. Pollichia, Bad Dürkheim N. F. 3: 275, 302, fig. 6.3, ♀, loc. typ.: unknown.

Taxonomic placement: *Dolerus frontalis* Zirngiebl, 1930.

Discussion: Zirngiebl stated neither the type locality, nor the size of the type series. The type specimen is missing. On pages 275 and 305 Zirngiebl mentions *Dolerus frontalis* as a new species, on table 6 figure 3 he shows a drawing of valvula 1 of the female genitalia. The whole publication is missing a description in words of *D. frontalis*. The species is available, because it was published before 1931 and the new taxon is accompanied by an indication in form of an illustration (Art. 12b 7 ICZN 1985). At the moment *D. frontalis* can not be related to another species of *Dolerus*, nor its validity can be confirmed.

Dolerus lucidus Zirngiebl, 1930

Zirngiebl, 1930. Mitt. pfälz. Ver. Naturk. Pollichia, Bad Dürkheim N. F. 3: 275, 302, fig. 3.2, ♀, loc. typ.: unknown. Preoccupied in *Dolerus* by Freymuth, 1870.

Taxonomic placement: *Dolerus gonager* (Fabricius, 1781).

Discussion: Zirngiebl (1937) himself synonymized this taxon with *D. gonager*: "Nachdem ich aber viele hunderte dieser Tiere gesehen, musste ich erkennen, dass dies Merkmal [große, glatte, leuchtende Stellen neben den Augen] nicht konstant ist, völlig verschwinden kann oder in verschiedensten Größen auftrat. Dazu kam die Gleichheit der Sägen [von *D. lucidus* und *D. gonager*], sodass ich diese Art nicht halten konnte." ['After having seen many hundred of these animals, I had to recognize, that this character [large, smooth and shining areas beside the eyes] is not constant, that it can disappear or vary in size. Additionally the saws [of *D. lucidus* and *D. gonager*] are identical so that I could not keep this species as a valid one'; translated from Zirngiebl 1937].

Zirngiebl stated neither the type locality, nor the size of the type series. A type specimen of *D. lucidus* could not be found.

Dolerus pratensis var. *major* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 139, ♀, loc. typ.: Germany, Leistadt.

Taxonomic placement: *Dolerus germanicus* (Fabricius, 1775).

Lectotype (hereby designated): ♀, "Leistadt-Pfalz Winterstal Juli 1932 Coll. Zirngiebl"; "Typ von *Dolerus pratensis* v. *major* Zrg. L. Zirngiebl det."; [red:] "Lectotypus ♀ *Dolerus pratensis* var. *major* Zirngiebl 1954 det. S. M. Blank '89"; "*Dolerus germanicus* F. ♀ det. Blank '91". The fifth and the following antennomeres of the right side are missing.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The name *major* was published as a trinomen, but Zirngiebl did not expressivly state it as a variety or a subspecies. The content of Zirngiebl's publication reveals, that the author meant "var." in this case. If *major* was a separate species, Zirngiebl would have given an individual number to it within this checklist. *D. pratensis* var. *major* is a form of *D. germanicus* with darkened abdominal tergites.

Dolerus puncticollis var. *confundens* Zirngiebl, 1937.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 347, ♀, loc. typ.: Lower Austria. Infrasubspecific name according to Art. 45 g ICZN (1985).

Taxonomic placement: *Dolerus vernalis* Ermolenko, 1964.

"Types": 4♀♀, "9.4.[18]65"; "Damianitsch Nied.-Oest."; "Ex Collectio Wien Dopp. d. Best. Send."; [only in one ♀:] "Type Coll. L. Zirngiebl"; [red:] "Kein Typus, infrasubspezifischer Name! S. M. Blank '92"; "*Dolerus vernalis* Ermolenko ♀ det. S. M. Blank '92".

Deposition: Zoologische Staatssammlung, Munich, and Naturhistorisches Museum, Vienna.

Discussion: *Dolerus puncticollis* var. *confundens* is a taxon of infrasubspecific rank. *D. vernalis* Ermolenko, 1964, is the valid name for this species (Blank 1993).

Emphytus balteatus var. *albimaculus* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 2: 646, ♂, loc. typ.: unknown. Infrasubspecific name according to Art. 45 g ICZN (1985).

Taxonomic placement: *Allantus balteatus* (Klug, 1818).

"Type": ♂, "243"; "Typ von *Emphytus balteatus* v. n. *albimacula* L. Zirngiebl det."; [red:] "Kein Typus! Infrasubspez. Name. teste S. M. Blank '93"; "*Allantus balteatus* (Kl.) ♂ det. S. M. Blank 93".

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The single male derives from a rearing (series no. 243). "Eines der ausgeschlüpften ♂♂

hat einen scharfen weissen Fleck". ['One of the emerged ♂♂ has a sharp white spot'; translated from Zirngiebl 1937]. The white spot might be identical with the white edge in the middle of the first abdominal tergite. In contrast to the rest of the reared series Zirngiebl described this single male specimen because of its lighter colouration. The name *Emphytus balteatus* var. *albimaculus* is of infrasubspecific rank (Art. 45 g ICZN 1985). The genitalia of the holotype agree with the drawings of *A. balteatus* in Koch (1988).

Emphytus balteatus var. *marginalis* Zirngiebl, 1954, nomen nudum

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 149.

Discussion: The name var. *marginalis* is listed without further description. *E. balteatus* var. *marginalis* is a nomen nudum. The single specimen, which was designated as the type by Zirngiebl, derives from the same reared series as *E. balteatus* var. *albimaculus* Zirngiebl, 1937.

Emphytus balteatus var. *nigrolinearis* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 2: 646, ♀, loc. typ.: Greece, Crete, Kristallenia.
Taxonomic placement: *Allantus balteatus* (Klug, 1818).

Holotype: ♀, "Kristallenia Mitte-Ende Juni"; "Kreta Rbl. '04"; "Ex Collectio Wien Dopp. d. Best. Send."; "Typ von *Emphytus balteatus* v. n. *nigrolinearis* L. Zirngiebl det."; [red:] "Holotypus ♀ *Emphytus balteatus* var. *nigrolinearis* Zirngiebl 1937 det. Blank 1989"; "*Allantus balteatus* (Klug) ♀ det. S. M. Blank 93". The holotype is in good condition.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The holotype agrees with the redescription of *A. balteatus* by Koch (1988) (i.e.: valvula 1 bearing 21 serrulae, antennae serrate below).

Emphytus basalis var. *masculus* Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 346, ♀, loc. typ.: Mongolia.
Taxonomic placement: *Allantus* spec.

Holotype: ♀, "N. Mongolei Leder 92"; "*Emphytus basalis* Knw. var. *masculus* n. ssp. det. Zirngiebl"; [red:] "Holotypus ♀ *Emphytus basalis* var. *masculus* Zirngiebl 1937 det. S. M. Blank (1989)". Both antennae of the holotype are missing.
Deposition: Naturhistorisches Museum, Vienna.
Discussion: One further female specimen from Kioto (coll. Zoologische Staatssammlung, Munich) was erroneously designated as a type specimen of *E. basalis* var. *masculus* by Zirngiebl. The name *masculus* has been used within *Emphytus* Klug, 1818, for an aberration by Dovnar-Zapolskij, but *masculus* Dovnar-Zapolskij is not available (*Emphytus cingulatus* ab. *masculus* Dovnar- Zapolskij, 1930, name of infrasubspecific rank according to Art. 45 f ii ICZN 1985). The status of *Emphytus basalis* var. *masculus*, which is a member of *Allantus* Panzer, 1801, can not be judged at the moment.

Emphytus perla var. *obscurus* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Pollichia, Dürkheim N. S. 3, 2: 150, ♀, loc. typ.: Germany, Leistadt.
Taxonomic placement: *Ametastegia carpini* (Hartig, 1837).

Lectotype (hereby designated): ♀, "Leistadt 1.VI.1934 Zirngiebl"; "Typ von *Emphytus perla* v. n. *obscura* L. Zirngiebl det."; [red:] "Holotypus ♀ *Emphytus perla* var. *obscurus* Zirngiebl 1954 det. S. M. Blank 1989"; "*Ametastegia carpini* (Hartig) ♀ det. S. M. Blank 93". The wings are partly slashed, the tips of valvulae 1 are broken.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The lectotype is strongly faded, but it obviously never possessed the colour pattern on the abdominal tergites, which is typical for *Ametastegia perla* (Klug, 1818). The specimen corresponds well with *A. carpini* (Hartig, 1837) in having warty punctures on the upper head, sharp serrulae on valvula 1 and an impunctate scutellum.

Eriocampa peineae Zirngiebl, 1956

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 322-325, 11, ♀♂, loc. typ.: Iran, Rescht, Taherguourabe.

Taxonomic placement: *Eriocampa peineae* Zirngiebl, 1956.

Holotype: ♀, "Iran (Recht) Tahergourabe (feucht) 0 m ü. M. V.1950 F. Schäuffele leg."; "*Eriocampa peineae* mihi ♀ Det. Zirngiebl 1955"; [red:] "Typus Nr."; [red:] "Holotypus ♀ *Eriocampa peineae* Zirngiebl, 1956 teste S. M. Blank 93."; "*Eriocampa peineae* Zirng. ♀ det. S. M. Blank 93". The whole left posterior tarsus and the apical segment of the right posterior tarsus are missing.

Paratype: 1♂ with identical labelling as the holotype.

Deposition: Staatliches Museum für Naturkunde, Stuttgart.

Discussion: Benson (1968) supposed *E. peineae* to be synonymous with *E. ovata* (Linné, 1761), but these taxa are clearly distinguishable from each other by several characters. *E. peineae* has the median mesonotal lobes red [median and lateral lobes red in *E. ovata*], coxae apically, second trochanters, knees, tibiae (except for tip of posterior tibiae) and tarsi yellowish white [coxae and middle and hind femora black, upper half of anterior side of anterior femora whitish, anterior side of anterior tibiae, base of middle and hind tibiae, anterior whitish, middle tarsi partly whitish], scape and pedicel partly, third antennomere apically, 4.-6. antennomeres yellowish white, apical segments black [1.-3. segments of antennae black, lower side of 4.-9. segments variably yellowish brown to white], areas lateral to the frontal field with scattered punctures, distance between punctures about the same as diameter of the punctures [this area closely punctured, between punctures there are only narrow ridges, some of the punctures coalescent], Abdominal tergites smooth and shining [2.-5. tergite with general alutaceous surface sculpture, 2.-8. tergite with fine and scattered punctures]. The male of *E. peineae* differs from the female in having black coxae and mesonotum, antennae with 3.-5. antennomeres apically and 6.-9. antennomeres on the lower side yellowish brown, lateral areas of the second tergite with alutaceous surface, 2.-7. tergites with very fine and widely scattered punctures.

Holcocneme lucida var. *rufa* Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 347, ♀, loc. typ.: Italy, Triest.

Taxonomic placement: *Nematus* (*Nematus*) spec.

Lectotype (hereby designated): ♀, "19.V.96 Triest"; "Coll. Graeffe"; "*Nematus lucidus*"; "*Holcocneme lucidus* Pz. var. *rufa* det. Zirng."; [red:] "Lectotypus ♀ *Holcocneme lucida* var. *rufa* Zirngiebl teste S. M. Blank 1991". The left flagellum of the holotype is missing, several parts of the legs are missing.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: *Holcocneme lucida* var. *rufa* can not be safely assigned to another species of *Nematus* subgen. *Nematus* Panzer, 1801.

Hoplocampa rutilicornis var. *pleuris* Zirngiebl, 1954

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 152, ♀, loc. typ.: Germany, Dannstadt.

Taxonomic placement: *Hoplocampa* spec.

Lectotype (hereby designated): ♀, "Naturschutzgebiet Dannstadt 23.4.1954 Coll. Zirngiebl"; [red:] "Lectotypus ♀ *Hoplocampa rutilicornis* var. *pleuris* Zirngiebl 1954 des. S. M. Blank (1991)". The lectotype is in good condition.

Paralectotypes: 4♀♀ from the same locality as the lectotype.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: At the moment *Hoplocampa rutilicornis* var. *pleuris* can neither be synonymized with a valid species of *Hoplocampa* Hartig, 1837, nor can its validity be confirmed.

Kokujewia clementi Zirngiebl, 1949

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 284, ♂♀, loc. typ.: Turkey, Akşehir [= Ak-Chehir].

Taxonomic placement: *Kokujewia ectrapela* Konow, 1902.

Lectotype (hereby designated): ♀, "Anatolien Ak-Chehir 1900 Korb"; "Cotyp"; "*Kokujewia* sp. n. ♀ E. Clément det."; "*Kokujewia clementi* Zirng. ♀ det. Zirng."; [red:] "Lectotypus ♀ *Kokujewia clementi* Zirngiebl 1949 des. S. M. Blank (1991)". Both antennae of the lectotype are missing.
Paralectotype: 1♂ from the same locality.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: *K. clementi* has been synonymized with *K. ectrapela* by Benson (1968).

Kokujewia ectrapela var. _clarescens_ Zirngiebl, 1949

Zirngiebl, 1949. Mitt. Münch. ent. Ges., München 35-39: 284, ♀, loc. typ.: Transcaucasus.
Taxonomic placement: *Kokujewia* spec.

Lectotype (hereby designated): ♀, "Transcauc."; [red:] "N. Kokujew"; [handwriting of Enslin:] "*Kokujewia ectrapela* ♀"; "*Kokujewia ectrapela* v. *clarescetum* [sic!] m. ♀"; [red:] "Lectotypus ♀ *Kokujewia ectrapela* var. *clarescens* ♀ des. S. M. Blank (1991)". The 3.-5. tarsomeres of the right anterior leg are missing.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: Presently *Kokujewia ectrapela* var. *clarescens* can neither be synonymized with *K. ectrapela* nor its validity can be confirmed.

Lophyrus rufiventris Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 338-339, ♀, loc. typ.: Albania, Merdita Munela.
Taxonomic placement: *Gilpinia rufiventris* (Zirngiebl, 1937).

Holotype: ♀, "1♀ aus Albanien (Merdita Munela) 1906".
Discussion: The type specimen, which should be deposited in the Naturhistorisches Museum Vienna according to Zirngiebl (1937), could not be found. The status of *L. rufiventris*, which was listed by Smith (1974) as a species of genus *Diprion* Schrank, 1802, is uncertain. Zirngiebl mentions a scalelike apical spur of the hind tibia, which can be found in certain species of *Gilpinia* Benson, 1939, i.e. *G. pallida* (Klug, 1812), *G. virens* (Klug, 1812) and *G. hercyniae* (Hartig, 1837) (cf. Smith 1979). None of these species agrees with the description of *rufiventris*.

Lygaeonematus pallipes var. _femoralis_ Zirngiebl, 1953, syn. nov.

Zirngiebl, 1953. Nachrichtenbl. bay. Ent., München 2: 32, ♂, loc. typ.: Germany, Alps of Ammergau, Frieder Massiv.
Taxonomic placement: *Pristiphora lativentris* (Thomson, 1871).

Holotype: ♂, "F. Daniel et J. Wolfsberger leg."; "Bav. mer. Ammergauer Berge Frieder-Gebiet 1700-2000 m 27.V.-1.VI.1948"; "*Amauronematus ?alpicola* Konow ♂ det. R. B. Benson 1952"; "*Lygaeonematus pallipes* var. det. Zirngiebl"; [red:] "Holotypus ♂ *Lygaeonematus pallipes* var. *femoralis* Zirngiebl 1953 det. S. M. Blank (1991)"; "*Pristiphora lativentris* (Thom.) det. S. M. Blank 94". The ninth segment of the left antenna is missing.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The holotype agrees with the description of *P. lativentris* in Benson (1958).

Metallus gei var. _egregius_ Zirngiebl, 1963, syn. nov.

Zirngiebl, 1963. Pfälz. Heimat, Speyer 14: 146-147, ♀. Infrasubspecific name according to Art. 16 and 45 f ICZN (1985).
Taxonomic placement: *Metallus lanceolatus* (Thomson, 1870).

"Types": 8♀♀, Birkenheide and Hildesheim.
Deposition: Zoologische Staatssammlung, Munich.
Discussion: The name var. *egregius* is not available, because it was described as a variety after 1960 and is therefore of infrasubspecific rank (Art. 16 and 45f ICZN 1985). The "types" in the collection of Zirngiebl agree with pale specimens of *Metallus lanceolatus* (Thomson, 1870).

Pamphilius inanitus var. *kruegeri* Zirngiebl, 1954, nomen nudum

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 179, W.

Discussion: A description of *P. inanitus* var. *kruegeri* is missing, thus the taxon has to be treated as a nomen nudum. The three "types" in Zirngiebl's collection belong to *P. inanitus* (Villers, 1789).

Pontania auberti Zirngiebl, 1957

Zirngiebl, 1957. Mitt. schw. ent. Ges., Lausanne 30: 173-174, ♀, loc. typ.: Algeria, Saïda.
Taxonomic placement: *Phyllocolpa ?leucostica* (Hartig, 1837).

Holotype: ♀, [red:] "Typus"; "Algerie Saïda, 5.4.1950 J. Aubert"; "PR 250 (VV)"; "*Pontania Auberti* Zrg. ♀ 1957 det. Zirngiebl"; [red:] "Holotypus ♀ *Pontania auberti* Zirngiebl 1957 det. S. Blank '89". Both flagella are missing, the saw is mounted on a separate slide [prep.-no. 250 (VV)].

Deposition: Musée Zoologique Cantonal, Lausanne.

Discussion: According to Kopelke und Lacourt (pers. comm.) *P. auberti* might be synonymous with *Phyllocolpa leucostica* (Hartig, 1837).

Pontania enslini Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 337-338, ♀, loc. typ.: Lappland, Nissontjokko.
Taxonomic placement: *Pontania herbaceae* (Cameron, 1758).

Holotype: ♀, "1♀ aus Lappland. (Torne träsk Nissontjokko) 1920 von O. Wetterstein gesammelt".

Discussion: According to Fischer, Kopelke (pers. comm.) and my own search the type can not be found in Vienna, Lausanne or Munich. One male specimen, which originates from the type locality, is deposited in the Naturhistorisches Museum Vienna, but it does not come into question as the holotype, because Zirngiebl definitely referred his description to a female specimen (description of the female saw sheath). Benson (1960), Muche (1970) and Krombein et al. (1979) synonymized *P. enslini* with *P. crassipes* auct. nec (Thomson, 1871) (= *P. herbaceae* (Cameron, 1875); Kopelke 1989, 1989, 1991).

Pontania femoralis var. *virilis* Zirngiebl, 1955

Zirngiebl, 1955. Pfälz. Heimat, Speyer 6: 68, ♀, loc. typ.: Germany, Dannstadt.
Taxonomic placement: *Pontania virilis* Zirngiebl, 1955.

Lectotype: ♀, "♀", "56/54"; "in Birkenheide geschlüpft"; "Naturschutzgebiet Dannstadt 12.4.1954 Coll. Zirngiebl"; "*femoralis* var. *virilis* Zrng., coll. Zirngiebl"; [red:] "Lectotypus *Pontania virilis* Zirng. det. Kopelke VII/89"; "*Pontania virilis* Zirngiebl 1955, Kopelke det. 1990". The lectotype is in good condition.

Paralectotypes: 3♀♀ from the same locality.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: Kopelke (1990), who investigated type specimens, regards *P. virilis* as a valid species, which causes galls on the leaves of *Salix purpurea*.

Pontania kirchneri Zirngiebl, 1954, nomen nudum

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 165, W.

Discussion: At this place a description of *P. kirchneri* is missing. Zirngiebl only writes: "An *Salix aurita*. Von [*Pontania*] *capreae* nicht leicht zu unterscheiden, jedoch Larve und Galle anders gebaut" ['On *Salix aurita*. Not easily distinguishable from [*Pontania*] *capreae*, but larva and gall different'; translated from Zirngiebl 1954]. Zirngiebl actually described *P. kirchneri* in 1959.

Pontania kirchneri Zirngiebl, 1959

Zirngiebl, 1959. Pfälzer Heimat, Speyer 9: 22-26, ♀, loc. typ.: Germany, Dürkheimer Bruch.
Taxonomic placement: *Pontania bridgmanii* (Cameron, 1883).

Holotype: ♀, "Elter *Pontania* spec. Zucht Nr. 40/53 Coll. Zirngiebl"; "Birkenheide-Pfalz 11.September 1953 Coll. Zirngiebl"; "Typ von / Holotyp *Pontania kirchneri* mihi L. Zirngiebl"; "*Pontania ?bridgmanii* (Cam.) Kopelke det. 11/88"; [red:] "Holotypus ♀ *Pontania kirchneri* Zirngiebl 1959 det. S. M. Blank (1991)". The holotype is in good condition.
Paratypes: 16♀♀ from Birkenheide, Eichweiler-Madenburg and Dürkheimer Bruch.
Deposition: Zoologische Staatssammlung, Munich; according to Zirngiebl further paratypes are deposited in coll. Lindqvist (Zoological Museum Helsinki), which have not been investigated by me.
Discussion: The synonymy with *P. bridgmanii* was proposed by Beneš (1968) for the first time. Also with reservations Kopelke treats *P. kirchneri* as a synonym of this species (Kopelke, pers. comm.). The labelling of the holotype is shown in fig. 2b.

Pristiphora beaumonti Zirngiebl, 1957

Zirngiebl, 1954. Mitt. schw. ent. Ges., Lausanne 30: 171-172, ♀, loc. typ: Algeria, Saïda.
Taxonomic placement: *Pristiphora beaumonti* Zirngiebl, 1957.

Holotype: ♀, [red:] "Typus"; "Algerie Saïda, 5.4.1950 J. Aubert"; "*Pristiphora DeBeaumonti* Zrg. ♀ 1957 det. Zirngiebl"; [red:] "Holotypus ♀ *Pristiphora beaumonti* Zirngiebl det. S. Blank '89". The right posterior femur, tibia and tarsus are missing.
Deposition: Staatliches Museum für Naturkunde, Stuttgart.
Discussion: Lacourt (1976) regarded *P. beaumonti* as a valid species and described the male gender of the species from Marocco.

Pseudocephaleia brachycerus Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 339-340, ♀, loc. typ.: Albania, Merdita.
Taxonomic placement: *Pseudocephaleia praeteritorum* (Semenov, 1934).

Holotype: ♀, "Merdita M. Schéit"; " *Pamphilius brachycerus* nov. spec. det. Zirngiebl"; [red:] "Type"; [red, Schedl teste:] "Holotypus *Pseudocephaleia brachycerus* Zirngiebl"; "*Pamphilius brachycerus* (Zirng.) ♀ det. W. Schedl 1981"; "*Pseudocephaleia praeteritorum* Sem. Tian-Sh. ♀ det. Blank". The left antenna is missing some flagellomeres, the left middle leg and both hind legs are missing the tarsi, the left anterior wing is damaged.
Deposition: Naturhistorisches Museum, Vienna.
Discussion: *P. brachycerus* has been synonymized with *P. praeteritorum* by Beneš (1984, cited in Achterberg & Aartsen, 1986).

Pteronus eurysternus var. *struvei* Zirngiebl, 1939, syn. nov.

Zirngiebl, 1939. Abh. naturw. Ver., Bremen 31(1): 109-111, ♀, loc. typ.: Germany, Borkum. Infrasubspecific name according to Art. 45 g ICZN (1985).
Taxonomic placement: *Nematus similator* Förster, 1854.

"Type": ♀, Borkum, 2.6.38, leg. Struve.
Deposition: Probably in the Westfälisches Landesmuseum für Naturkunde, Münster.
Discussion: Zirngiebl lists "zwei *Pteronus*-Arten, die zu *eurysterna* zu zählen sind" ['two *Pteronus* species, which belong to *eurysterna*'; translated from Zirngiebl 1939]. Henceforth Zirngiebl calls these two "species" the light and the dark form: *P. eurysterna* var. *lutescens* Enslin, 1916, and *Pteronus eurysterna* var. *struvei*. "Sägescheide, Stigma und Flügelgeäder stimmen mit der Enslin-Beschreibung völlig überein, ebenso die Plastik des Kopfes, so daß ich in der vorliegenden Wespe eine Verdunkelung der *Pteronus eurysterna* erblicke, eine Varietät, die ich zu Ehren Herrn Struves benenne" ['Saw, stigma and wing venation agree perfectly with the description of Enslin, just so the morphology of the head, so that I recognize the submitted sawfly as a darkened specimen, a variation, which I name in honor

of Mr Struve'; translated from Zirngiebl 1939). Zirngiebl himself refers to the fact that both specimens were captured at the same locality. The content of the description reveals that Zirngiebl meant infrasubspecific rank when he described *P. eurysternus* var. *struvei.*

The Westfälisches Landesmuseum für Naturkunde, where Struve's collection is preserved, probably keeps the "type". Despite several inquiries addressed to Dr. M. Berger at this museum I did not receive the "type" specimen. Two specimens of the Münster collection, which have been determined as *P. eurysternus* by Zirngiebl, lack the original determination label of Zirngiebl. They bear a handwritten notice (of F. and R. Struve?) on the lower side of another label, which does not refer to var. *struvei* (Ritzau, pers. comm.).

Selandria flavens var. *antennalis* Zirngiebl, 1954, syn. nov.

Zirngiebl, 1954. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 2: 145, ♂, loc. typ.: Germany, Zeiskam.

Taxonomic placement: *Brachythops flavens* (Klug, 1816).

Holotype: ♂, "Zeiskam 2.V.27"; "*Selandria flavens* v. *antennaris* [sic!] Zirng."; [red:] "Holotypus *Selandria flavens* var. *antennalis* Zirngiebl 1954 det. S. M. Blank (1991)"; "*Brachythops flavens* (Klug) ♂ det. S. M. Blank 93". The right middle leg is missing.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The holotype of *S. flavens* var. *antennalis* has black coloured basal antennomeres. This colouration lies within the range of variation of *B. flavens.*

Selandria flavens var. *flavissima* Zirngiebl, 1961, syn. nov.

Zirngiebl, 1961. Mitt. Pollichia pfälz. Ver. Naturk. Nat.Schutz, Bad Dürkheim N. F. 3, 8: 187, ♂. Infrasubspecific name according to Art. 16 and 45 f ICZN (1985).

Taxonomic placement: *Brachythops flavens* (Klug, 1816).

"Type": 1♂ from Dürkheimer Bruch.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: The taxon *Selandria flavens* var. *flavissima* is not available, because it was described as a variety after 1960 and therefore has only infrasubspecific rank (Art. 16 and 45 f ICZN 1985). The "type" specimen agrees well with *B. flavens.*

Selandria serva var. *punctata* Zirngiebl, 1956, syn. nov.

Zirngiebl, 1956. Mitt. Münch. ent. Ges., München 46: 322, ♂, loc. typ.: Iran, Recht, Tahergourabe.

Taxonomic placement: *Selandria serva* (Fabricius, 1793).

Holotype: ♂, "Iran (Recht) Tahergourabe (feucht) 0 m ü. M. V.1950 F. Schäuffele leg."; "*Selandria serva* var. *punctatus* m. ♂ Det. Zirnbiebl 1955"; [red:] "Typus"; [red:] "Holotypus ♂ *Selandria serva* var. *punctata* Zirngiebl, 1956 teste S. M. Blank 93"; "*Selandria serva* var. *punctata* Zirng. det. S. M. Blank 93". The holotype is missing the right anterior and the left posterior tarsus.

Deposition: Staatliches Museum für Naturkunde, Stuttgart.

Discussion: The upper 2/3 of the mesepisterna of *S. serva* var. *punctata* bear fine punctures, the distance between them in the centre of the mesepisterna measures about 4 times their own diameter. One additional male specimen collected in Syria (Halab, Jisr ech Chogur, 21.3.1979, leg. Kinzelbach; coll. Blank) has more minutely punctate mesepisterna, two further male specimens from the same locality have almost impunctate mesepisterna. Central European males have impunctate mesepisterna. No genitalmorphological differences could be found among Central European, Syrian and Iranian male specimens (cf. Koch 1986). At the moment there is not enough material of *S. serva* from the eastern mediterranean area available to decide, whether *S. serva* var. *punctata* is a valid subspecies or a morphological variety of *S. serva.*

Sirex antennatus var. *immaculatus* Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 350, ♀ loc. typ.: Japan, Etorofu-Islands.
Taxonomic placement: *Sirex* spec.

Lectotype (hereby designated): ♀, "Japan leg. Niijima"; "Etorofu- Isl. [... (Japanese)] V.III.1923"; "*Sirex antennatus* Marl. var. nov. *immaculata* Zir. ♀"; [red:] "Lectotypus ♀ *Sirex antennatus* var. *immaculatus* Zirngiebl 1937 des. S. M. Blank 1991". The tip of the saw, the tip of the right antenna and a part of the right hind tarsus are missing.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: The status of *Sirex antennatus* var. *immaculatus* can not be judged at the moment.

Tenthredo carolinae Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 351-352, ♂, loc. typ.: Turkestan, Mts. Chissar.
Taxonomic placement: *Tenthredo variabilis* (Mocsáry, 1909).

Holotype: ♂, "Turkestan Mts. Ghissar F. Hauser 1898"; "*Tenthredo carolinae* nov. spec. det. Zirngiebl"; "*Tenthredo carolinae* nov. spec."; [red:] "Holotypus ♂ *Tenthredo carolinae* Zirngiebl 1937 det. S. M. Blank (1989)"; "*Tenthredo variabilis* Mocs. ♀ det. S. M. Blank 91". The holotype is missing both posterior tarsi.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: Zhelochovtsev (1976) synonymized *T. carolinae* with *T. pamyrensis*, Taeger (1988, 1992) accepted this opinion. The examination of the holotype resulted in the new synonymy with *T. variabilis*.

Tenthredo maculata var. *collaris* Zirngiebl, 1940, syn. nov.

Zirngiebl, 1940. Verh. Ver. naturw. Heimatforsch., Hamburg 28: 84-85, ♀, loc. typ.: Austria, Emms.
Taxonomic placement: *Tenthredo maculata* ssp. *maculata* Geoffroy, 1785.

Lectotype (hereby designated): ♀, "Emms Ob.Öst. Sarg 1916"; [red:] "Lectotypus ♀ *Tenthredo maculata* var. *collaris* Zirngiebl des. Blank (1989)". The Lectotype is in good condition.

Paralectotype: 1♀ from the same locality.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: *T. maculata* var. *collaris* was described due to the almost black pronotum and the yellow tegulae. The colouration of pronotum, tegulae and scutellum is quite variable in *T. maculata*. Variably light coloured specimens can be found at the same locality. *T. maculata* var. *collaris* is a synonym of *T. maculata*.

Tenthredo maculata var. *coloris* Zirngiebl, 1940

Zirngiebl, 1940. Verh. Ver. naturw. Heimatforsch., Hamburg 28: 84-85, ♀, loc. typ.: Italia, Antonimina.
Taxonomic placement: *Tenthredo maculata* ssp. *diana* Benson, 1968.

Lectotype (hereby designated): ♀, "Antonimina Paganetti"; "*Tenthredo maculata coloris* m."; [red:] "'Typus' ♀ *Tenthredo maculata* var. *coloris* Zirngiebl 1940 des. S. M. Blank (1991)"; "*Tenthredo maculata* ssp. *coloris* Zirng. det. Blank '91". The right flagellum is missing.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: Pesarini (1988) notes that the name *coloris* is not available because it refers to an unit of infrasubspecific rank. Zirngiebl related the newly described taxon to a particular geographical area, the locality Antonimina, erroneously published as Antomimina (cf. labelling of the holotype shown in fig. 2c). With this statement one criterion of Art. 45 g ii ICZN (1985) could be interpreted to be fulfilled. Nevertheless I follow Pesarini to preserve the current usage of the name *diana*.

Tenthredo maculata var. *wagneri* Zirngiebl, 1940, syn. nov.

Zirngiebl, 1940. Verh. Ver. naturw. Heimatforsch., Hamburg 28: 84-85, ♂, loc. typ.: Germany, Leistadt.

Taxonomic placement: *Tenthredo maculata* ssp. *maculata* Geoffroy, 1785.

Lectotype (hereby designated): ♂, "Tertiär-Kalk Leistadt 1933 Zirngiebl"; "*Tenthredo maculata* v. *wagneri* m."; [red:] "Lectotypus ♂ *Tenthredo maculata* var. *wagneri* Zirngiebl 1940 des. S. M. Blank (1991)". The lectotype is in good condition.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: Zirngiebl investigated at least two syntypes, because he writes of the type localities Hamburg and Leistadt, but only one male specimen could be found. *T. maculata* var. *wagneri* was described due to the yellow pronotum and the almost black scutellum. The colouration of the body is variable in *T. maculata*, thus this variety is proposed as a synonym (cf. discussion under *T. maculata* var. *collaris*).

Tenthredo velox var. *alpina* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 345, ♀, loc. typ.: Switzerland, Alps near Bern [Berner Alpen]. Preoccupied in *Tenthredo* by Zetterstedt, 1838 [= *Hoplocampa alpina* (Zetterstedt, 1838)].

Taxonomic placement: *Tenthredo velox* Fabricius, 1798.

Holotype: ♀, "1♀ Schweiz (Berner Alpen) 1867 von Rogenhofer erbeutet".

Deposition: Probably in the Naturhistorisches Museum, Vienna.

Discussion: The type specimen, which should be preserved in the Naturhistorisches Museum Vienna according to Zirngiebl (1937), could not be located. The status of *T. velox* var. *alpina* can not be judged at the moment.

Tenthredo velox var. *nigripleuris* Zirngiebl, 1937, syn. nov.

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 345, ♂, loc. typ.: Austria, Schneeberg. Preoccupied in *Tenthredo* by Enslin, 1910.

Taxonomic placement: *Tenthredo velox* Fabricius, 1798.

Lectotype (hereby designated): ♂, "Schneeberg 9.7.84"; "Kolazy"; "*Tenthredo velox* var. *nigripleuris* ssp. n. ♂ det. Zirngiebl"; "*Tenthredo velox* var. *nigripleuris* ssp. n. ♂"; [red:] "Lectotypus ♂ *Tenthredo velox* var. *nigripleuris* Zirngiebl 1937 des. S. M. Blank (1989)". The lectotype is in good condition.

Deposition: Naturhistorisches Museum, Vienna.

Discussion: In the collection of the Naturhistortisches Museum Vienna there is only a male specimen of *T. velox* var. *nigripleuris*, which agrees with the original description. Obviously Zirngiebl mentioned the female genus erroneously in his description. *T. velox* var. *nigripleuris* agrees well with *T. velox*.

Tenthredopsis parvula var. *nigrilobis* Zirngiebl, 1937

Zirngiebl in Struve, 1937. Abh. naturw. Ver. Bremen 30(1/2): 134, ?♀♂, loc. typ.: Germany, Borkum.

Taxonomic placement: *Tenthredopsis* spec.

"Type": Borkum.

Discussion: Struve (1937) lists a "*Tenthredopsis parvula* Knw. var. *nigrilobis* Zirngiebl, var. nov." and describes the colouration of the variety. Zirngiebl is cited as the author of var. *nigrilobis* by Struve. Type specimens could not be found in the collection of the Zoologische Staatssammlung. Probably they are preserved at the Westfälisches Landesmuseum für Naturkunde in Münster. The status of *T. parvula* var. *nigrilobis* can not be judged at the moment.

Tomostethus orientalis Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 335-336, ♀♂, loc. typ.: Turkey, Istanbul, Kutshuk-tshekmedie.

Taxonomic placement: *Tomostethus orientalis* Zirngiebl, 1937.

Paratype: ♀, "Apfelbeck Byzant. Kuc. Tschek."; "Paratype Coll. Zirngiebl"; [red:] "Paratypus ♀ *Tomostethus orientalis* Zirngiebl 1937 teste S. M. Blank 93". The paratype is in poor condition: the abdomen is broken, the wings are slashed, several tarsomeres are missing, the valvulae 1 and 2 are broken.

Deposition: Zoologische Staatssammlung, Munich.

Discussion: Describing *T. orientalis* Zirngiebl investigated three specimens. One male and one female specimen, which should be preserved at the Naturhistorisches Museum Vienna, are probably lost. Zirngiebl called these specimens "Typus", he probably meant the holotype and allotype. Thus the only remaining specimen is a paratype. *T. orientalis* is morphologically very similar to *T. nigritus* (Fabricius, 1804), but it can be distinguished from this species by the red knees and tarsi (posterior tarsi partly darkened) and the brownish wings. *T. orientalis* differs from *T. nigritus* ssp. *claripennis* Enslin, 1913, by the brownish, not clear wings, and from *T. melanopygius* (Costa, 1859) and *T. melanopygius* var. *pleuriticus* Enslin, 1914 by the completely black abdomen (cf. Enslin 1914).

Xiphydria maidli Zirngiebl, 1937

Zirngiebl, 1937. Festschr. 60. Geb. Strand, Riga 3: 342-343, ♀, loc. typ.: Russia, Eastern Sibiria, Chabarowsk, Krasnaja Ajotschka.

Taxonomic placement: *Euxiphydria potanini* (Jakovlev, 1891).

Lectotype (hereby designated): ♀, "Krasnaja Ajotschka bei Chabarowsk leg. Babyi VIII.1917"; "*Xiphydria maidli* nov. spec. det Zirngiebl"; "6"; [red:] "Type"; [red:] "Lectotypus ♀ *Xiphydria maidli* Zirngiebl 1937 det. S. M. Blank (1989)"; "*Euxiphydria ruficeps* ♀ (Mocs.) det. Blank". The lectotype is in good condition.

Paralectotype: 1♀ from Japan.

Deposition: Lectotype in Naturhistorisches Museum, Vienna, Paralectotype in Zoologische Staatssammlung, Munich.

Discussion: Takeuchi (1938) synonymized *X. maidli* with *Euxiphydria ruficeps*, Watanabe (1956) accepted this status. *E. ruficeps* is a junior synonym of *E. potanini* (cf. Smith 1978).

Holo- and paratype have perhaps been designated by Zirngiebl himself, otherwise he never used this kind of red type label. In the original description he mentions the Siberian specimen as the type.

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17. Robert, B. & W. Wichard: Kartierung der Köcherfliegen in Nordrhein-Westfalen. - Entomologische Mitteilungen aus dem Löbbecke-Museum + Aquazoo, Beiheft 2, Düsseldorf, 1994. 227 S.

Das Heft präsentiert den aktuellen Wissensstand über die Verbreitung aller 202 nachgewiesenen Köcherfliegenarten in Nordrhein-Westfalen. Diese reiche Köcherfliegenfauna erklärt sich zum einen aus der geographischen Lage des Landes, Tiefland und Bergland sind vertreten; aber auch aus dem guten Bearbeitungszustand durch die Faunisten vor Ort. Davon zeugt schon das sehr umfangreiche Literaturverzeichnis überwiegend faunistisch ökologischer Arbeiten, das die Autoren, selbst langjährige Sammler und ausgezeichnete Sachkenner, zur Auswertung zusammengetragen haben.

Für jede Art wurde eine Gitternetzkarte erstellt, deren Einheit die Topographische Karte 1:25000 (Meßtischblatt) ist, in dem sich durch eine dunklere Schattierung das Bergland vom Tiefland abhebt. Die Häufigkeit der Nachweise der Art ist durch entsprechende Punktsymbole im Gitternetz festgehalten. Abgerundet werden die Karten durch kurze Bildunterschriften zur Verbreitung, Abgrenzung zu anderen Arten, ökologische Daten. Die Problematik der Kartierung liegt darin, daß sie hauptsächlich auf dem Nachweis durch Imagines beruht, die mit Lichtfallen gefangen wurden. Die nur bedingte Aussagekraft von Lichtfallenfängen - nicht alle Arten werden erfaßt, kein Bezug zum Schlupfgewässer möglich - ist bekannt. Andererseits nahmen die Autoren 13 Arten, deren Nachweis nach derzeitigem Wissensstand nur auf unbestimmbare Larven zurückgeht und für NRW unwahrscheinlich ist, nicht in die Kartierung mit auf. Das gleiche gilt für 7 Arten durch Imaginalbestimmung. Man kann die Köcherfliegenexperten Nordrhein-Westfalens beglückwünschen, daß ihnen eine derart fundierte, gründlich recherchierte Arbeit für ihre weitere Forschung, z.B. im Artenschutz, zur Verfügung steht. H. Burmeister

18. Grosse, W.-R.: Der Laubfrosch *(Hyla arborea)*. - Die Neue Brehm-Bücherei, Bd. 615, Westarp Wissenschaften, Magdeburg, 1994. 211 S., 108 Abb., 38 Tab. - ISBN 3-89432-407-4.

Eine Monographie über den europäischen Laubfrosch *(Hyla arborea)* ist schon seit langem fällig. W.-R. Grosse hat sie, unter Verarbeitung einer beachtlichen Literaturmenge, erstellt. Eine große Fülle von Themen wird angesprochen. Das beginnt bei der systematischen Stellung des Laubfrosches, seiner innerartlichen Gliederung, der Verbreitung und Beschreibung der Arten und Unterarten. Dabei werden auch die nahe verwandten Arten *Hyla meridionalis*, *H. savignyi*, *H. sarda* und H. *japonica* berücksichtigt. Man hätte sich allerdings gewünscht, daß die Arten und Unterarten nach ihren Merkmalen genauer präzisiert und begründet gegeneinander abgegrenzt worden wären. Es folgen Kapitel mit den morphologischen Merkmalen, über die Organe und ihre Funktionen, zur Ökologie, zum Verhalten, über Paarung, Fortpflanzung und Entwicklung. Alle Aussagen werden mit einer Fülle von Abbildungen und Tabellen belegt. Ergänzend wäre indessen eine vergleichende graphische Darstellung von Laich, Kaulquappe und metamorphosierendem Jungfrosch für den Feldherpetologen von Nutzen. Ein besonders wichtiger Abschnitt behandelt schließlich Gefährdung und Schutz des Laubfroschs. Hier werden nicht nur die Bestandssituationen im Verbreitungsgebiet dargestellt, wobei man jedoch einen Hinweis auf die Verhältnisse in Südbayern vermißt, sondern es werden auch Gefährdungsursachen und konkrete Schutzmaßnahmen sehr übersichtlich referiert. Die recht optimistischen Ansichten des Autors zur Wiederansiedlung von Laubfröschen in ehemaligen Verbreitungsarealen kann der Referent allerdings nur bedingt teilen. Insgesamt eine fleißige, verdienstvolle Arbeit, die jeden Amphibienfreund und Biotopkartierer interessieren muß. U. Gruber

19. Wichard, W., Arens, W., & G. Eisenbeis: Atlas zur Biologie der Wasserinsekten. - Gustav Fischer Verlag, Stuttgart, Jena, New York, 1995. 338 S., 912 REM-Fotos. ISBN 3-437-30743-6.

Nach dem erfolgreichen Atlas zur Biologie der Bodenarthropoden der Autoren Wichard & Eisenbeis ist nun dieser neue Bildatlas dem aquatischen Lebensraum zahlreicher Insekten gewidmet. Die Bedeutung des Funktionswandels von luftatmenden Tracheentieren zu submers lebenden limnischen Tieren steht mit den zahlreichen Anpassungen im Vordergrund. So bestimmen Mechanismen der Diffusion vom Medium Wasser in ein geschlossenes Tracheensystem und die Stabilisierung einer Luftblase am Körper und der Atemgasaustausch an oder in diese Blase die optimale Nutzung des feuchten Lebensraumes. Die hervorragenden rasterelektronischen Bilder zu den Organellen und Oberflächenstrukturen der Wasserinsekten zeigen in eindrücklicher Weise die jeweiligen Sonderbildungen. Dies gilt auch in besonderem Maße für die Typen der Nahrungsaufnahme oder der Bewegung auf und unter der Wasseroberfläche. Auch erkennt man die Freude der Autoren am Objekt, wobei die Frage nach der Funktion durchaus einmal in den Hintergrund treten kann. Viele Bilder geben die Faszination an den Oberflächenstrukturen mit ihrer Fülle von filigranen Mustern wieder. Systematisch gegliedert werden exemplarisch Vertreter von den Collembola (Springschwänze) bis zu den Diptera-Brachycera (Fliegen) behandelt. Der zu den Bildtafeln gestaltete, informative kurze Text, vielfach erklärend erweitert durch Detailzeichnungen, ist prägnant und verweist zudem auf die im Verzeichnis aufgelistete umfangreiche Literatur zu jeder Tiergruppe. Dieses Buch zeigt jedem Biologen auch die Möglichkeit, biologisch wesentliche Körperdetails darzustellen. E.-G. Burmeister

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Die Acrolepiidae und Epermeniidae der Nepal-Expeditionen der Zoologischen Staatssammlung München sowie eine neue *Epermenia* aus China

(Insecta, Lepidoptera)

Von **Reinhard Gaedike**

Gaedike, R. (1996): The Acrolepiidae and Epermeniidae of the expeditions of the Zoologische Staatssammlung München to Nepal and a new *Epermenia* species from China (Insecta, Lepidoptera). – Spixiana **19/2:** 221-227

The material of the expeditions of the Zoologische Staatssammlung München to Nepal contains two new species of the family Acrolepiidae: *Digitivalva dierli,* spec. nov. and *Acrolepiopsis triangulata,* spec. nov. and two new species of the family Epermeniidae: *Epermenia (Calotripis) bicornutella,* spec. nov. and *Epermenia (Cataplectica) nepalica,* spec. nov. Additionally there is described *Epermenia (Cataplectica) sinica,* spec. nov. from China.

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Durch das Entgegenkommen von Herrn Dr. W. Dierl war es mir möglich, die während der Nepalexpeditionen gefangenen Falter der beiden Familien Acrolepiidae und Epermeniidae zu untersuchen. Das Material enthielt einige neue Arten, deren Beschreibung hier vorgelegt wird. Vier Falter können zur Zeit noch nicht eindeutig determiniert werden. Es handelt sich um Einzeltiere, bei denen es noch unklar ist, ob sie zu bisher noch unbeschriebenen Taxa gehören.

Die Bearbeitung des Nepalmaterials wird genutzt, um eine neue *Epermenia*-Art aus China zu beschreiben, die mir Herr Dr. D. Stüning, Forschungsinstitut und Museum Alexander Koenig, Bonn, aus den Aufsammlungen von H. Höne zur Verfügung stellte.

Familie Acrolepiidae

Digitivalva dierli, spec. nov.
Abb. 1, 2, 8

Typen. Holotypus: ♂, Nepal, Prov. Nr.3, East Junbesi, 2750 m, 25.-31.VII.1964, leg. W. Dierl, Gen. Präp. R. Gaedike Nr. 4246. - Paratypen: 1♂, 2♀♀, mit den gleichen Daten; 1♂, Nepal, Prov. Nr. 2, East Bhandar, unter Thodung, 2200 m, 3.VIII.1964, leg. W. Dierl; 2♂♂, 1♀, Nepal, Prov. Nr.2, East Jiri, 2000 m, 8.IV., 13.VIII.1964, leg. W. Dierl.

Der Holotypus und 5 Paratypen in der Zoologischen Staatssammlung München, 2 Paratypen im DEI Eberswalde. Terra typica: Nepal, East Junbesi.

Beschreibung. Falter: Spannweite 12-14 mm; Kopf, Thorax hell, mit hellbraunen Schuppen durchsetzt, Palpen aufgebogen, Innenseite weiß; Antennen ½ Vorderflügellänge, geringelt; Vorderflügel auf hellem Grund mit zahlreichen hellbraunen bis braunen Schuppen; am Hinterrand bei ⅓ ein breiter dunkelbrauner, fast rechteckiger Fleck bis zur Zelle, von dort als verwaschene, heller braun gefärbte Binde schräg basal zum Costalrand reichend; beiderseits des Flecks am Hinterrand fast einfarbig weiße

Flächen; bei ½ ein weiterer, heller braun gefärbter Fleck, apikal mit verwaschener Grenze, im Bereich der Zelle in eine größere heller braun gefärbte Fläche übergehend; apikale Flügelhälfte insgesamt dunkler; Fransen um den Apex herum mit drei dunklen Schuppenlinien; am Costalrand vor dem Apex zwei kurze schräge dunkle Streifen; Hinterflügel einfarbig hellgrau.

♂ Genitalien (Abb. 1-2): Vinculum ohne Übergang in den breiten Saccus übergehend; Aedoeagus länger als der Uncus-Vinculum-Komplex, leicht gebogen, mit breiter runder Basis; Valve mit rechteckigem Basalteil, nach außen verrundet ausgezogen; Costalarm lang, an der Basis am schmalsten, in zwei leicht vorgezogenen Spitzen endend, beborstet.

♀ Genitalien (Abb. 8): Papillen des Ovipositors mit vielen feinen Zähnchen besetzt, die Zapfen zwischen den vorderen Apophysen mit starken Borsten besetzt; Ostium mit ringförmiger Sklerotisierung, Anfangsteil des Ductus bursae etwas stärker sklerotisiert.

Die neue Art gehört in die Verwandtschaft von *D. moriutii*, unterscheidet sich von dieser aber äußerlich durch die weniger kontrastreiche Färbung. Im Genitalbau liegen die Unterschiede im Bau des Saccus und der Valve sowie in der anderen Form des Ostium und der anderen Bedornung der Ovipositorpapillen.

Acrolepiopsis triangulata, spec. nov.

Abb. 3, 4, 9-11

Typen. Holotypus: ♂, Nepal, Prov. Nr. 3 East Khumjung, 3800 m, 25.VI.1964, leg. W. Dierl, Gen. Präp. R. Gaedike Nr. 4252. - Paratypen: 3♂♂, 5♀♀, mit den gleichen Daten; 3♂♂, 2♀♀, 1 Ex. ohne Abdomen, dto., 20.V.1964; 1♂, dto., 15.VI.1964; 6♂♂, 1♀, dto., 16.VI.1964; 4♂♂, 3♀♀, 3 Ex. ohne Abdomen, dto., 17.VI.1964; 2♀♀, dto., 18. VI. 1964; 11♂♂, 1♀, 2 Ex. ohne Abdomen, dto., 24.VI.1964; 2♂♂, 1♀, dto., 27.VI.1964; 2♂♂, 1♀, dto., 29.VI.1964; 11♂♂, 4♀♀, dto., 30.VI.1964; 10♂♂, 6♀♀, dto., 1.VII.1964; 1♂, dto., 10.VII.1964; 17♂♂, 4♀♀, 3 Ex. ohne Abdomen, dto., 12.VII.1964; 29♂♂, 11♀♀, 1 Ex. ohne Abdomen, dto., 14.VII.1964; 5♂♂, 2♀♀, dto., 15.VII.1964; 1♂, Nepal, Prov. Nr. 3, East Pheriche, 4300 m, 5.VII.1964, leg. W. Dierl.

Der Holotypus und 142 Paratypen in der Zoologischen Staatssammlung München, 20 Paratypen im DEI Eberswalde.

Terra typica: Nepal, Prov. Nr. 3: East Khumjung.

Beschreibung. Falter: Spannweite 13-16 mm; Kopf, Thorax und die nach oben aufgebogenen langen Palpen hellbraun, Innenseite der Palpen und Kopfpartie über der Zunge einfarbig heller, fast fahlgelb; Antennen geringelt, Basalglied unterseits ebenfalls sehr hell; Vorderflügelfärbung variiert stark: Am Hinterrand bei ⅓ ein mit mehreren kleinen dunklen Linien unterbrochener dreieckiger weißer Keilfleck, die Basis am breitesten, beiderseits mit dunkleren Schuppenflächen eingefaßt, am Beginn der Fransen die Andeutung eines sehr kleinen weißen Fleckes; dunkelbraune Schuppenflächen an der Basis des Costalrandes, oberhalb des Keilfleckes und hinter der Mitte am Costalrand in Form einer schräg nach unten ziehenden, am Zellenende durch helle Schuppen unterbrochenen Binde, die fast die Fransen erreicht; Costalrand sonst hell, mit vielen sehr kleinen und kurzen dunkelbraunen Strichen; die übrige Flügelfläche mit helleren Schuppen bedeckt, von fahlgelb bis braun; auf den Fransen zwei dunkle Schuppenlinien.

Variabilität: Gesamtfärbung des Vorderflügels dunkler; der weiße Keilfleck am Hinterrand schmal, an der Basis kaum breiter als am Ende, kaum durch dunkle Schuppen unterbrochen; vor der Flügelspitze liegt innerhalb der helleren Schuppenfläche ein scharf abgesetzter dunkler, pfeilförmiger Fleck, die dunkle unterbrochene Binde kaum auffallend.- Vorderflügel fast einfarbig dunkelbraun, weiß sind der Keilfleck (schmal) sowie einige kleine weiße Punkte am Hinterrand; die dunkle Binde hebt sich kaum vom Untergrund ab; auch die Färbung von Kopf, Thorax und Palpen ist sehr dunkel, nur die Innenseite der Palpen, die Unterseite des ersten Antennengliedes und einige Schuppen des Nackens sind noch heller.

♂ Genitalien (Abb. 3-4): Saccus lang und schmal, Valve mit gleichförmig verrundetem Basalteil, mit langen Borsten besetzt, Costalarm fast parallelseitig, erst im letzten Viertel in einer dreieckigen Spitze endend; Aedoeagus so lang wie der Gnathos-Vinculum-Saccus-Komplex zusammen, mit großer runder Basis, gleichmäßig bis zur Spitze sich verjüngend, an der Spitze mit sehr kleinen Dornen in der Vesica.

♀ Genitalien (Abb. 9-11): Apophysen kurz, die beborsteten Zapfen zwischen ihnen tropfenförmig, verrundet endend, mit langen Borsten besetzt; Ostium mit einer breiten verrundet-rechteckigen Platte, Öffnung mit einer ringförmigen, oben verbreiterten Sklerotisierung, in der Bursa zwei stabförmige Signa mit einem gezähnelten Kiel, die Länge variiert (Abb. 10-11).

Der Name der neuen Art leitet sich ab von der dreieckigen Gestalt der Valvenspitze. Sie ist durch die Form der Valve mit keiner bisher bekannten Art der Gattung zu verwechseln.

Familie Epermeniidae

Epermenia (Calotripis) bicornutella, **spec. nov.**
Abb. 5-7

Holotypus: ♂, Nepal, Prov. Nr. 2, East Jiri, 2000 m, 13.VIII.1964, leg. W. Dierl, Gen. Präp. R. Gaedike Nr. 4391 (Zoologische Staatssammlung München).
Terra typica: Nepal, Prov. Nr. 2: East Jiri.

Beschreibung. Falter: Spannweite 10 mm; Kopf, Antennen, Palpen und Tegulae hell sandfarben, Außenseite der Palpen mit dunkleren braunen Schuppen, wie auch der Thorax; Vorderflügel schmal, Grundfarbe ebenfalls hell sandfarben; am Hinterrand bei $^1/_3$ und bei $^2/_3$ ein großer Schuppenzahn aus an der Spitze fast schwarzen Schuppen, im letzten Flügeldrittel auch über den Fransen weitere dunkle Schuppen; in der Mittellinie über dem 2. Zahn und bei $^3/_4$ ein sehr kleiner schwarzer Schuppenpunkt, jeweils in einem fast weißen Feld; zwischen den beiden Punkten ein ocker bis bräunlich gefärbtes Feld, das bis zur Flügelspitze reicht, am Costalrand dunkler gefärbt; ebenfalls dunkler gefärbt ist der Costalrand an der Flügelbasis sowie eine Fläche oberhalb des 1. Schuppenzahnes.
Eine genauere Charakterisierung der Zeichnung ist wegen des Erhaltungszustandes nicht möglich.
♂ Genitalien (Abb. 5-7): Uncus sehr lang und schmal, spitz endend, Tegumen ohne besondere Bildungen; Valve gedrungen, Transtilla lang, schmal, Ampulle relativ klein, leicht gebogen, spitz endend, eine deutlich sklerotisierte Grenze zum übrigen Valvenkörper bildend, sie reicht weit in den Cucullus hinein, der die Ampullenspitze überragt; Sacculus mit einem deutlich ausgebildeten sklerotisierten Zahn; Valvenbasis mit einer stärker sklerotisierten Leiste; Aedoeagus deutlich länger als die Valve, Seitenränder stärker sklerotisiert, mit zwei Cornuti, der kleinere stark sklerotisiert, Vorderkante sägeartig, mit einer ausgezogenen Spitze an der Oberkante, Basis verrundet, der zweite nur sehr schwach sklerotisiert, etwa $^1/_2$ so lang wie der Aedoeagus, mit verrundeter Spitze.
♀ Genitalien: Unbekannt.

Die neue Art ähnelt im Flügelschnitt und in der Zeichnung etwas den hellen Exemplaren von *E. strictella* und *E. aequidentella,* von denen sie sich aber im Genitalbau deutlich unterscheidet. Zwei Cornuti besitzt auch *E. chaerophyllella,* mit dieser ist die neue Art aber schon äußerlich nicht zu verwechseln.

Epermenia (Cataplectica) nepalica, **spec. nov.**
Abb. 12-15

Typen. Holotypus: ♂, Nepal, Prov. Nr. 3, East Khumjung, 3800 m, 30.VI.1964, leg. W. Dierl, Gen. Präp. R. Gaedike Nr. 4393. - Paratypus: 1♀, vom gleichen Fundort, 27.VI.1964, leg. W. Dierl. Die Typen befinden sich in der Zoologischen Staatssammlung München.
Terra typica: Nepal, Prov. Nr. 3: East Khumjung.

Beschreibung. Falter: Spannweite 18 mm; Kopf, Antennen, die aufgebogenen Palpen und Tegulae hell ockerfarben (beim Holotypus durch teilweise Verölung dunkler), Palpenaußenseite dunkler; Vorderflügel am Hinterrand bei $^1/_4$ und bei $^1/_2$ mit einem schwarzen Schuppenzahn, bei $^2/_3$ die Andeutung eines dritten Zahnes; in der Mittellinie, über dem ersten Zahn und bei $^2/_3$ je ein kleiner schwarzer Schuppenpunkt. von einem hellen kleinen Feld umgeben; auf den Fransen am Außenrand eine geschwungene dunkle Schuppenreihe, der Außenrand deshalb sichelförmig erscheinend, der gesamte übrige Flügel beim Holotypus fast gleichförmig mit dunklen braunen Schuppen bedeckt, der Paratypus deutlich heller: die Felder um die beiden schwarzen Punkte viel größer, unterhalb des ersten Punktes zu einer weißen Fläche bis zum Hinterrand ausgedehnt, ebenfalls fast weiß eine Fläche zwischen den Schuppenzähnen am Hinterrand. Ob diese Variabilität in der Zeichnung geschlechtstypisch ist, kann nur durch weitere Falterfunde geklärt werden.
♂ Genitalien (Abb. 13-15): Uncus relativ kurz, breit, basal verbreitert, mit verrundeter Spitze, Vinculum mit gerandeter Oberkante; Valve langgestreckt, Transtilla kaum abgesetzt, stärker sklerotisiert,

Ampulle lang, gebogen, spitz endend, den Cucullus etwas überragend, die Grenze zum übrigen Valvenkörper nur schwach abgedeutet, Sacculus mit spitzem Zahn; Aedoeagus so lang wie die Valve, etwas gebogen, die konkave Seite mit einer Längssklerotisierung; Cornutus fast so groß wie der gesamte Aedoeagus, in drei unterschiedlich stark sklerotisierten und verschieden langen Spitzen endend.

♀ Genitalien (Abb. 12): VIII. Tergit fein gezähnelt, die gegabelten Apophysen relativ kurz; Hinterkante des VII. Sternits zur Mitte leicht eingesenkt, in einem zu den Rändern schmaler werdenden Bereich stärker sklerotisiert, Bursa ohne Signum.

Die neue Art ähnelt äußerlich etwas der aus Afghanistan beschriebenen *E. vartianae*, im Bau des Genitalapparates bestehen aber deutliche Unterschiede: Tegumenrand bei *vartianae* nicht gerandet, Cornutus nicht in drei verschiedenen Spitzen endend.

Epermenia (Cataplectica) sinica, spec. nov.
Abb. 16-18

Holotypus: ♂, China: Li-Kiang, Prov. Nord-Yuennan, 19.7.1934, leg. H. Höne, Gen. Präp. R. Gaedike Nr. 4394 (Museum A. Koenig, Bonn).

Terra typica: China, Prov. Nord-Yünnan: Li-Kiang.

Beschreibung. Falter: Spannweite 22 mm; Kopf, Antennen, Palpen, Tegulae und Thorax dunkel ockerfarben bis braun, Innenseiten der Palpen heller.

Da die Flügel vor allem im basalen Drittel stark abgeschuppt sind, ist die Zeichnung nur teilweise erhalten, es fehlen dadurch auch Hinweise auf das Vorhandensein von Schuppenzähnen.

Auf dem Vorderflügel in der Mittellinie bei ⅓ ein kleiner dunkler Punkt, bei ½ beginnt eine schräg nach oben vorn bis zum Costalrand ziehende dunkel ockerfarbene breite Binde, der gesamte Flügelbereich vor dem Apex ist ebenfalls so dunkel gefärbt, eine dunkelbraune Fläche liegt unmittelbar vor dem Apex und über dem Hinterrand bei ¾, dort ein Dreieck mit ausgezogenen Seiten bildend; auf den Fransen des Außenrandes dunkle Schuppen, die den Außenrand sichelförmig erscheinen lassen.

♂ Genitalien (Abb. 16-18): Uncus breit, relativ kurz, in einer breit verrundeten Spitze endend, Tegumen an der Innenkante leicht gerandet, Valve groß, Transtilla deutlich, rechteckig, stärker sklerotisiert, Ampulle stark nach unten gebogen, nicht länger als der Cucullus, Grenze zum übrigen Valvenkörper deutlich, Sacculus mit spitzem Zahn; Aedoeagus etwas länger als die Valve, leicht gebogen, mit einer Längssklerotisierung, Cornutus fast so lang wie der gesamte Aedoeagus, breit, in drei stärker sklerotiserten Spitzen endend.

♀ Genitalien: Unbekannt.

Die neue Art ähnelt der aus Nepal beschriebenen *nepalica*, im Genitalbau bestehen aber Unterschiede: Uncus endet breit löffelförmig, Außenrand des Tegumen nicht gerandet, Transtilla deutlich rechteckig, Cornutusform anders.

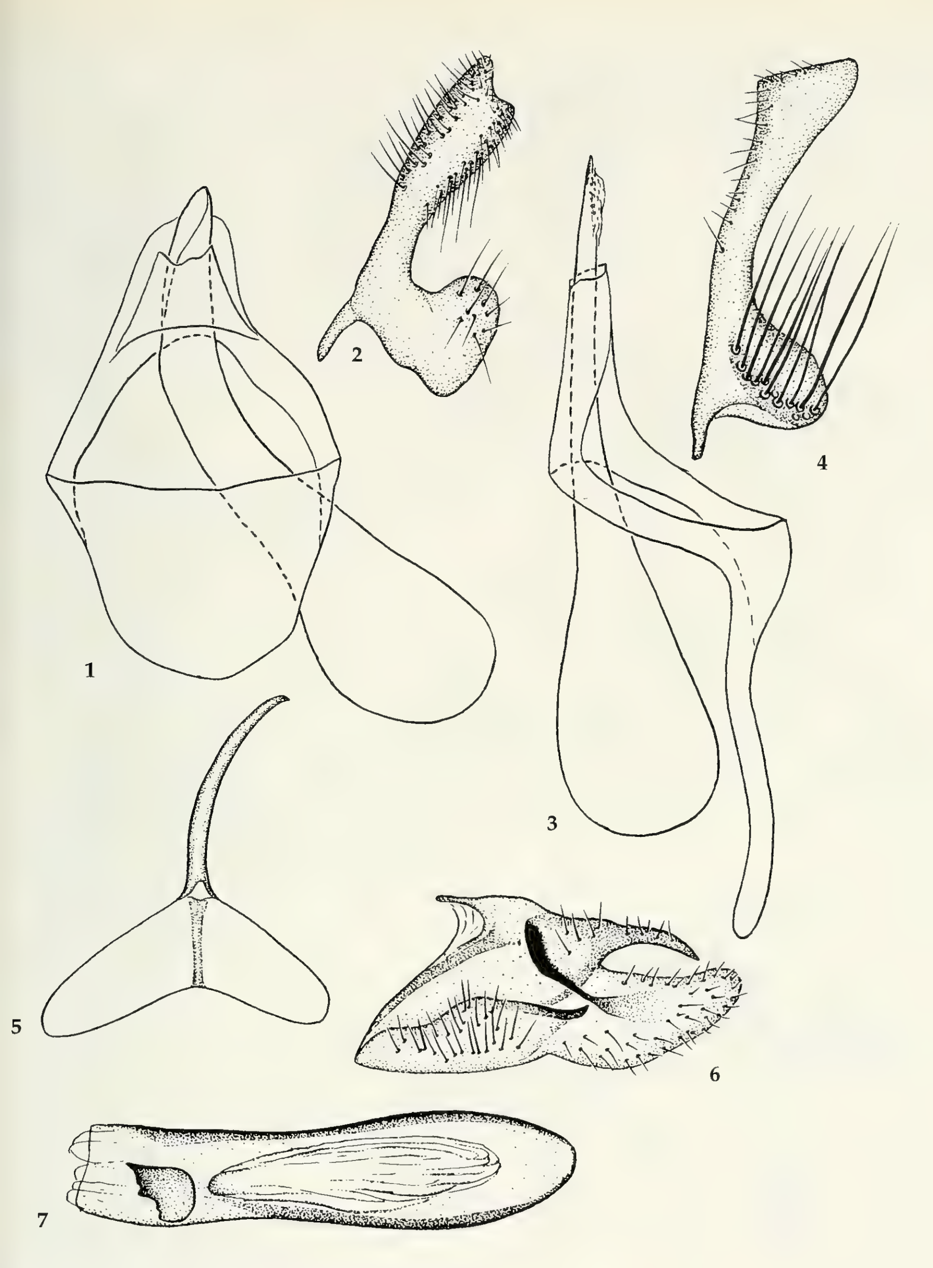


Abb. 1-2. *Digitivalva dierli*, spec. nov. (linke Valve entfernt).
Abb. 3-4. *Acrolepiopsis triangulata*, spec. nov. (linke Valve entfernt).
Abb. 5-7. *Epermenia bicornutella*, spec. nov. 5. Uncus-Tegumen; 6. rechte Valve; 7. Aedoeagus).

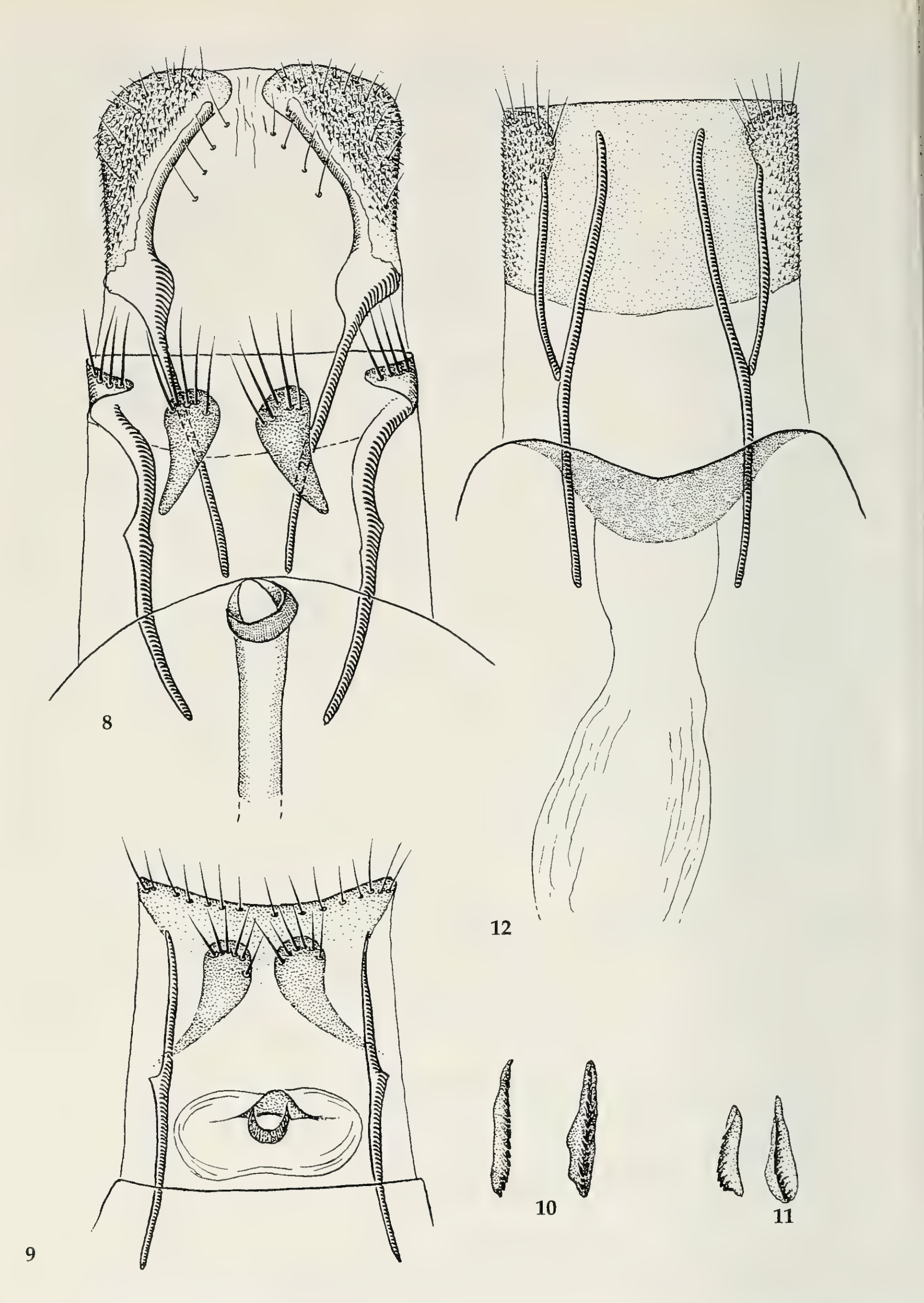


Abb. 8. *Digitivalva dierli*, spec. nov.
Abb. 9-11. *Acrolepiopsis triangulata*, spec. nov. 9. Ostiumbereich; 10. Signa; 11. Variabilität der Signaform und -größe.
Abb. 12. *Epermenia nepalica*, spec. nov.

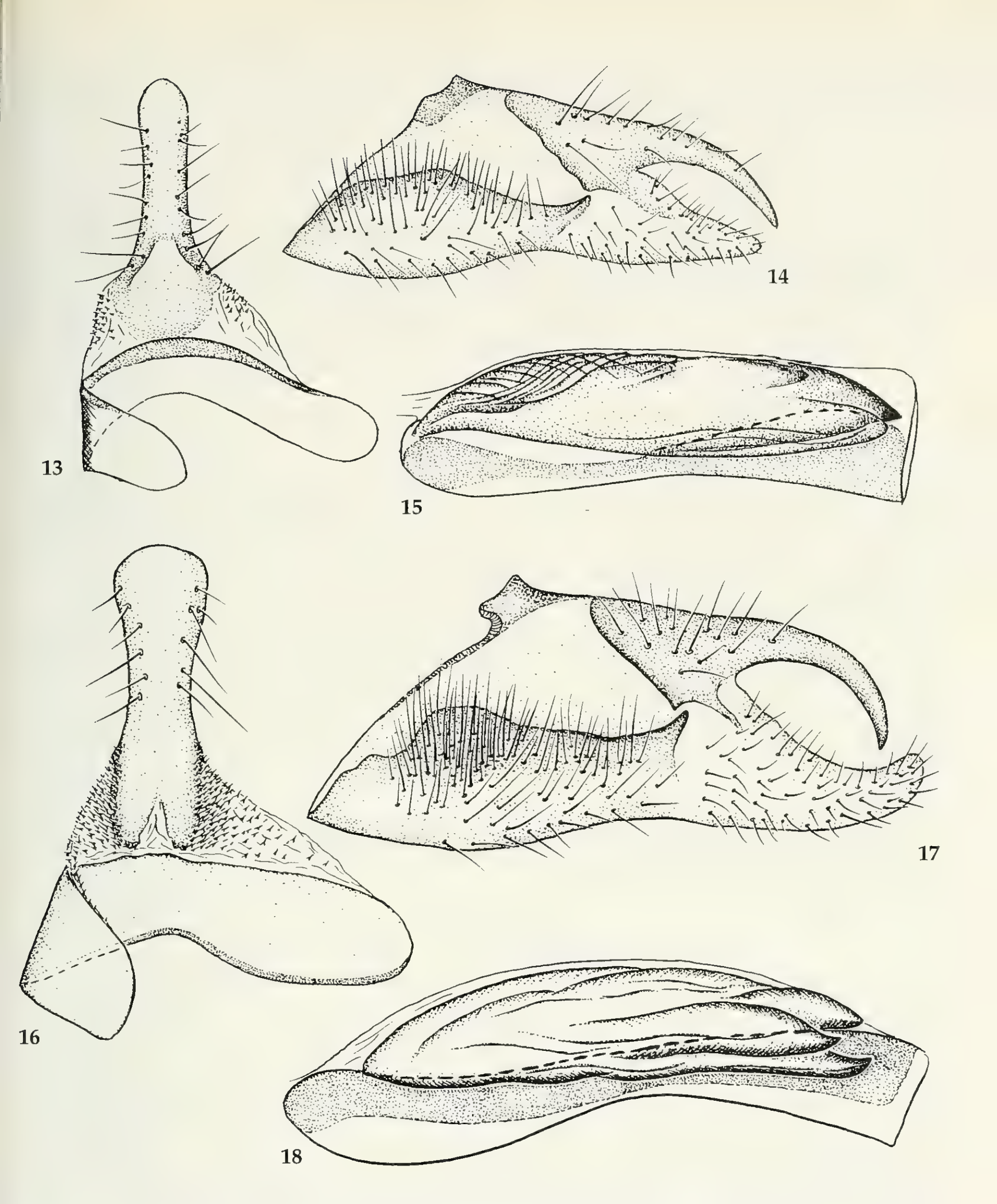


Abb. 13-15. *Epermenia nepalica*, spec. nov. 13. Uncus-Tegumen; 14. rechte Valve. 15. Aedoeagus.
Abb. 16-18. *Epermenia sinica*, spec. nov. 16. Uncus-Tegumen; 17. rechte Valve; 18. Aedoeagus.

20. Smith, H. M. & R. B. Smith: Synopsis of the Herpetofauna of Mexico, Volume VII, Bibliographic Addendum IV and Index, Bibliographic Addenda II-IV, 1979-1991. - University Press of Colorado, 1993. 1082 S. ISBN 0-87081-284-X.

Dieser umfangreiche Band ist ein einziger Index zur Herpetofauna Mexikos. Er folgt mit jeweils einer Einführung einem Primärindex und einer Synonymliste einem durchgängigen Schema bei jeder der behandelten Gruppen. Diese sind in der Klasse der Amphibien nach Caudata (Schwanzlurche), Anura (Froschlurche) und Gymnophiona (Blindwühlen), bei den Reptilien nach Testudines (Schildkröten), Sauria (Echsen), Amphisbaenia (Doppelschleichen), Serpentes (Schlangen) und Crocodylia (Krokodile) geordnet. Für jede Art oder Unterart gibt es eine Autorenliste mit Seitenzahlen. Den Schluß bildet ein Literaturverzeichnis von 323 Seiten. Ein vollständiges und umfangreiches Nachschlagewerk für den spezialisierten Systematiker und Museums-Herpetologen. U. Gruber

21. Ax, P. (ed.): Microfauna Marina, Volume 9. - Gustav Fischer Verlag, Stuttgart, Jena, New York, 1994. 350 pp. ISBN 3-437-30779-7 hbk; ISSN 0176-3296.

"What's up in Göttingen?" one may title this volume, because 16 (of 18) articles are by authors of the group around editor Peter Ax in Göttingen. Fortunately this has no influence on the high quality of the contributions. The majority of papers concerns species descriptions of the marine microfauna: Plathelminthes - Seriata; Polychaeta - Hesionidae; Plathelminthes - Typhloplanoida; Plathelminthes - Dalyelloida; Crustacea - Copepoda; Polychaeta - Syllidae. Several papers are based on fine-structural work (all by Ulrich Ehlers and coauthors) describing spermiogenesis, protonephridia, epidermis, and body wall musculature: Beate Sopott-Ehlers describes the fine-structure of female gametes of free-living Plathelminthes ("Turbellaria").

Two larger contributions are of more general interest: Birger Neuhaus presents 96 pages of "Ultrastructure of alimentary canal and body cavity, ground plan, and phylogenetic relationships of the Kinorhyncha", a thorough TEM-study on a largely unknown group. A phylogenetic analysis (applying the Hennigian methodology) of the Aschelminthes is also provided. The 50 pages by Thomas Bartolomaeus "On the ultrastructure of the coelomic lining in the Annelida, Sipuncula and Echiura" provide for the first time a clear and unequivocal definition of (eu-) coelomate Spiralia: The inner (visceral) coelomatic wall of true (eu-)coelomates is always built up by epithelio-muscle cells and functions as a muscle sheath of the gut. This should also clarify the long-lasting discussion about groups such as Mollusca and Nemertinea, which are often considered as "coelomate", although lacking this character entirely. A small contribution by Ulrich Ehlers on the clear lack of the "Pseudocoel" in Nematoda should finally clarify also this question resp. mis-spelling.

Summing up, the present volume of "Microfauna Marina" can be recommended not only for taxonomic specialists of the marine microfauna. It includes also important contributions to increase our understanding of the phylogenetic relationships of spiralian and aschelminth phyla. G. Haszprunar

22. Stachowitsch, M.: The Invertebrates. An Illustrated Glossary. - Wiley-Liss, New York, Chichester, Brisbane, Toronto, Singapore, 1992. 676 pp. ISBN 0-471-83294-4 hbk; ISBN 0-471-56192-4 pbk.

This is an unique and in current times of specialization nearly incredible contribution, the significance of which cannot be estimated too high. The author presents morphological and anatomical terms of the whole animal kingdom (with the exception of vertebrates) usually down to the level of traditional classes. All in all 77 taxa are described by more than 10.000 terms, which are illustrated by nearly 80 tables.

Each taxon is represented by a full page schematic drawing showing the generalized body plan as well as variations of features, which are important for morphology or systematics. Terms are arranged alphabetically, each term is shortly defined with cross citations of other terms which are explained elsewhere. The author did a very careful work, I could not find any misnomer throughout the book.

In addition, German equivalents of all entries are provided. These are of particular importance for the non-German speaking world and provide a key for the (usually classic) German literature. I would like to see also French equivalents in the (hopefully) second edition of this fine volume. All in all, the present volume can be highly recommended for the student, for teachers and for the scientist. For little money - in particular the paperback edition is quite cheap - they all will receive a key to the diversity and complexity of the animal kingdom.

G. Haszprunar

SPIXIANA	19	2	229–232	München, 01. Juli 1996	ISSN 0341–8391

Chironomids with "M-fork". A reevaluation of the wing venation of the *Corynoneura*-group

(Insecta, Diptera, Chironomidae)

By **Ole A. Sæther & Liv Kristoffersen**

Sæther, O. A. & L. Kristoffersen (1996): Chironomids with "M-fork". A reevaluation of the wing venation of the *Corynoneura*-group (Insecta, Diptera, Chironomidae). – Spixiana **19/2:** 229-232

Reexamination of the wing venation in *Corynoneura* Winnertz and *Thienemanniella* Kieffer shows that previous interpretations of the wing venations were mistaken. The clavus consists mainly of R_1, R_{2+3} and the contracted costa; the "false vein" is in reality a reduced R_4 (or R_{4+5}), and M is forked into R_5 or (M_1) and M_{3+4} (or M_2).

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Introduction

While examining the new genus *Physoneura* Ferrington et Sæther (1995) it was deemed necessary to compare the wing venation of the genus with representatives of the genera *Corynoneura* Winnertz and *Thienemanniella* Kieffer as well as with a new genus, *Tempesquitoneura*, being described by Epler and De la Rosa (1995). The result of this reexamination led to a new interpretation of the wing nervature of these genera.

Material

Specimens of the following species were examined:

Corynoneura carinata Singh et Maheshwari, ♂.
Corynoneura celtica Edwards, ♂.
Corynoneura fittkaui Schlee, ♂.
Corynoneura lacustris Edwards, ♂.
Corynoneura lahuli Singh et Maheshwari, ♂.
Corynoneura lobata Edwards, ♂, ♀.
Corynoneura oxfordana Boesel et Winner, ♂.
Corynoneura scutellata Winnertz, ♂.
Corynoneura taris Roback, ♂.
Corynoneura, spp. nov. 1-5, ♂♂, ♀♀.
Thienemanniella acuticornis (Kieffer), ♂.
Thienemanniella sanctivincenta Sæther, ♂, ♀.
Thienemanniella semifimbriata Sæther, ♂, ♀.
Thienemanniella similis Malloch, ♂, ♀.

Thienemanniella cf. *vittata* Edwards, ♂.
Thienemanniella xena Roback, ♂.
Thienemanniella, spp. nov. 1, 2, ♂.

The wing venation of the *Corynoneura*-group

The wing of the *Corynoneura*-group has been interpreted as having a contracted costa apically fused with R_1 and R_{4+5} forming a so-called clavus, and with a weak false vein continuing from RM towards the apex of the wing (Schlee 1968, Hirvenoja & Hirvenoja 1988, Cranston et al. 1989). There is a distinct sexual dimorphism with the females having a much longer clavus. Except for the upper veins with the clavus the remaining veins often are very indistinct and unclear.

However, a close examination shows that R_{4+5} in the male imagines does not participate in the formation of the clavus as also mentioned by Ferrington & Sæther (1995). The clavus is formed by a thickening of R_1 and probably a R_{2+3} which together with the retracted and thickened costa are forming the clavus. In nearly all chironomids the R fork (FR) carries a sensillum campaniformium and R_{4+5} originates below this sensillum. The so-called "false vein" in the male imagines of the *Corynoneura* group originates at the same position and thus in reality is the R_{4+5} vein. This vein is very weak, but it is strengthened by a vein running parallel and very close to it. This second vein apparently is formed as the upper branch of a forked M vein, i.e. it could be a M_1 vein. The furcation of M in some species is almost impossible to discover as it is very close to RM. This is true for most male imagines of *Thienemanniella* (Figs 8-10). In the male imagines of *Corynoneura*, however, the furcation is distinctly distal to RM (Figs 1-5) making a clear M-fork.

When evaluating the female imagines (Figs 6, 7) a different interpretation becomes more likely. Here, R_{4+5} is thickened basally and continues distally in a thin R_{4+5} vein previously regarded as a false vein. [The male imago of *Physoneura* Ferrington et Sæther (1995, fig. 2) show the same configuration.] In some specimens this vein appears to be split into two veins, presumably R_4 and R_5. This split may have continued down to the base in the course of evolution and then, in *Corynoneura*, being displaced distally along the M-vein. The M according to this interpretation bifurcates into R_5 and M_{1+2}. In most specimens of the *Corynoneura* group (Figs 4, 5, 8, 10; Hirvenoja & Hirvenoja 1988, fig. 3) there is an additional apical "false" vein between R_{4+5} (or R_5) and M. This vein may represent the vestige of M_1.

Phylogenetic implications

In the chironomid literature there are widely differing opinions about the systematic placement of the *Corynoneura*-group. According to Goetghebuer (1914, 1932, 1939) and Lindeberg (1962) the group may deserve its own subfamily. Goetghebuer regards the group as directly descended from the ancestor of the Orthocladiinae, while Lindeberg proposes to include the group as a tribe (Corynoneurini) together with the tribes Podonomini, Protanypini (Protanypodini) and Tanypodini in a subfamily Tanypodinae. Zavřel (1928), Edwards (1929), Brundin (1956), Schlee (1968), and Sæther (1977) on the other hand agree that the *Corynoneura*-group belongs to the Orthocladiinae. While Zavřel, primarily based on the morphology of the immatures, finds it justified to erect a separate tribe for the group, Edwards, Brundin and Schlee regards the group as directly evolved from the most apomorphic members of the "*Smittia*"-group, particularly *Pseudosmittia* Goetghebuer. Sæther (1977) maintains a somewhat intermediate view. The group forms the sister group of the "*Smittia*"- plus the "*Orthocladius*"-groups of genera, i.e. most of the Orthocladiinae but excluding the most plesiomorphic genera including those with double gonostylus in the male and three seminal capsules in the female.

Regarding the M-vein as furcating into M_1 and M_2 would lend support to the theory of Lindeberg, regarding the group as one of the most primitive of chironomids, as it could indicate that the *Corynoneura*-group had maintained the wing venation of the Ceratopogonidae. However, that would also imply that *Corynoneura* was the most plesiomorphic genus of the group and the male imagines of *Corynoneura* as having a more plesiomorphous state of wing venation than the females, since the M-fork here is best developed. All other evidence, however, indicate *Corynoneura* as the most apomorphic, and the females as having a more plesiomorphous wing nervature. If the upper branch of the M-fork

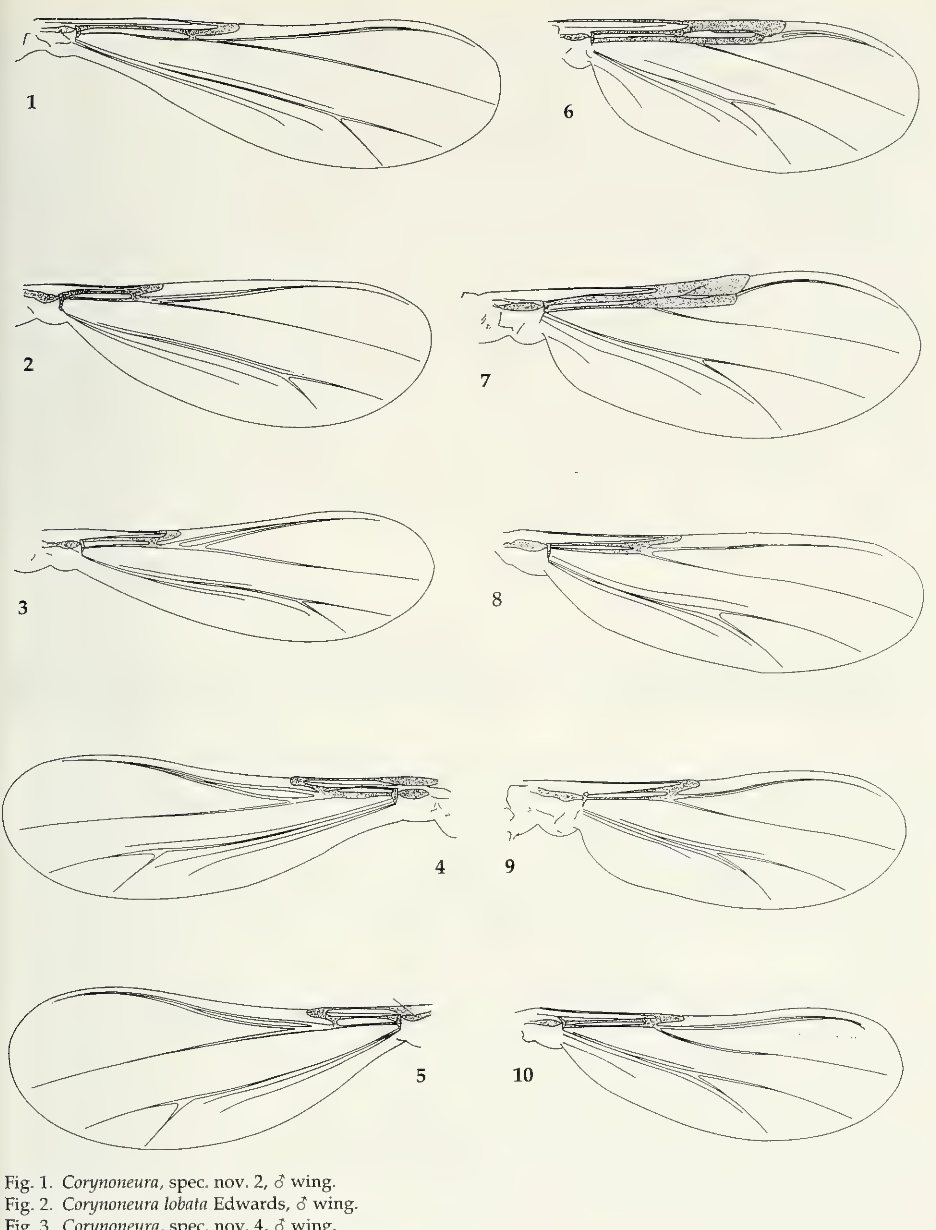


Fig. 1. *Corynoneura*, spec. nov. 2, ♂ wing.
Fig. 2. *Corynoneura lobata* Edwards, ♂ wing.
Fig. 3. *Corynoneura*, spec. nov. 4, ♂ wing.
Fig. 4. *Corynoneura oxfordana* Boesel et Winner, ♂ wing.
Fig. 5. *Corynoneura lacustris* Edwards, ♂ wing.
Fig. 6. *Thienemanniella sanctivincenta* Sæther, ♀ wing.
Fig. 7. *Thienemanniella similis* Malloch, ♀ wing.
Fig. 8. *Thienemanniella xena* Roback, ♂ wing.
Fig. 9. *Thienemanniella semifimbriata* Sæther, ♂ wing.
Fig. 10. *Thienemanniella*, spec. nov. 2, ♂ wing.

is regarded as R_5 with the M-fork being a secondary development originating from a splitting of R_{4+5} into R_4 and R_5, the development would be from *Physoneura* to *Thienemanniella* to *Corynoneura*, with the females having the more plesiomorphous state of wing nervature. This would be in better accordance with other evidence, but do not lend support to any phylogenetic placement of the group since the configuration would be an autapomorphy for the group.

We consider the placement of the *Corynoneura*-group within the Orthocladiinae as well established. However, the only evidences for regarding the *Corynoneura*-group as belonging to the more advanced orthoclads being closely related to *Pseudosmittia* are to be found in the wing venation. The senior author together with Dr. L. C. Ferrington recently has completed a revision of the genus *Pseudosmittia*. There are no species with the same configuration of the R-veins, and no species with indication of an M-fork. However, several species have a straight Cu_1-vein and a very high VR ratio like in the *Corynoneura*-group. There are, however, also several species with less distally placed Cu-fork and a curved or sinuous Cu_1 and these species are more plesiomorphically placed within the genus. The high VR ratios and the straight Cu_1 thus cannot be anything else than parallelism or convergence and give no evidence for regarding the *Corynoneura*-group as related to the most advanced orthoclads. The *Corynoneura*-group show a number of unique synapomorphies not found in any other group. They, however, also show a number of apomorphies also found elsewhere such as the platelike superior volsella of the *Rheocricotopus*-group, the pearls on the pupal wing sheath of the genera near *Heterotrissocladius* Spärck, the caudal hooklets on the pupal tergites (here minute) of the *Cardiocladius*-group and so on. The exact placement of the *Corynoneura*-group cannot as yet be ascertained. The different placements as being closely related to *Pseudosmittia*, as not at all being orthoclads, or as being the sister group of all other orthoclads, however, all are refuted.

Acknowledgements

We are grateful to Drs. L. C. Ferrington Jr., Lawrence, Kansas/USA, and P. H. Langton, Huntington/England; for discussions on the wing venation of the *Corynoneura* group. Dr. Ferrington and M. Bolton, Columbus, Ohio/USA, supplied some of the material examined.

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INHALT - CONTENTS



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SPIXIANA	19	3	233–238	München, 01. November 1996	ISSN 0341-8391

Two new species of the genus *Naevius* Roth

(Arachnida, Araneae, Desidae)

By **Antonio Domingos Brescovit & Alexandre Bragio Bonaldo**

Brescovit, A. D. & A. B. Bonaldo (1996): Two new species of the genus *Naevius* Roth (Arachnida, Araneae, Desidae). – Spixiana **19/3:** 233-238

Two new species of the genus *Naevius* are described: *N. zongo* from Bolivia and *N. manu* from Peru. The placement of *Naevius* in Dictynoidea is confirmed by tracheal morphology, and some characters are added to the original description of the genus.

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Introduction

Naevius was proposed by Roth (1967) in the family Agelenidae, subfamily Cybaeinae. Until now, the genus contained only the type species, *N. varius*, described by Keyserling (1880) from Peru and originally assigned to *Cybaeus* L. Koch. The genus was transferred to the family Amaurobiidae and included in the subfamily Desinae by Lehtinen (1967), who suggested that *Naevius* could be a relative of the Chilean genus *Porteria* Simon.

Forster (1970), in a different concept from that of Lehtinen, considered the genera *Desis* and *Matachia* to belong to the subfamily Desinae, in the newly ranked family Desidae. Forster did not propose any placement of the other genera attributed to the subfamilies Desinae and Matachiinae of Lehtinen's Amaurobiidae. Thus, the catalog of Brignoli (1983) showed *Naevius* listed under Desidae incertae sedis, together with those genera included in Lehtinen's Desinae and Matachiinae that were not transferred to other families by recent authors.

The present paper reports two new species of *Naevius*: *N. zongo*, collected during a recent expedition to Bolivia (see Höfer & Brescovit 1994) and *N. manu* from Peru.

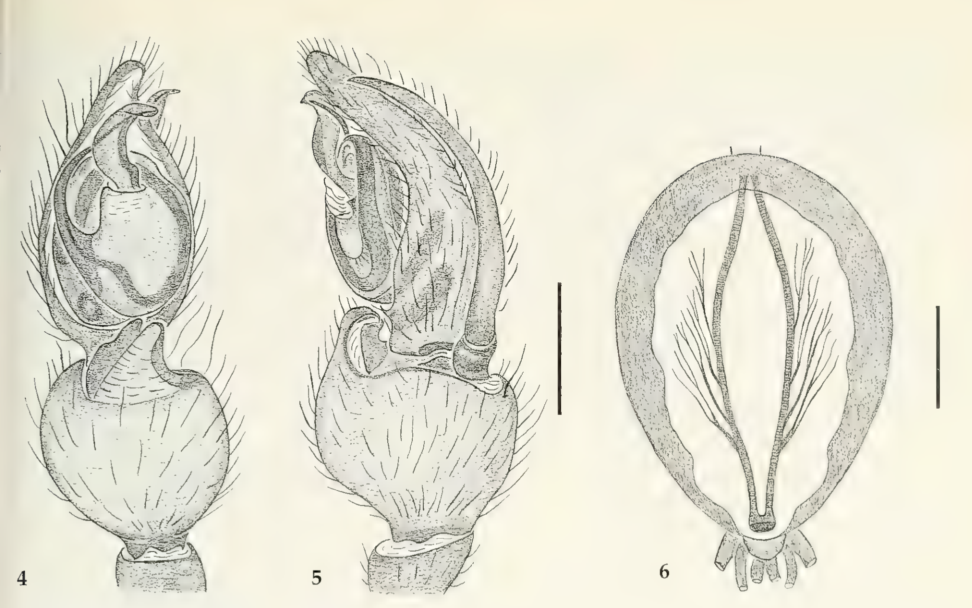
Little can be done on the family level without a better evaluation of the other genera incertae sedis, currently listed in Desidae. Nevertheless, examination of the tracheal system of a juvenile of *N. zongo* (Fig. 6) showed a branched pattern similar to that present in the New Zealand cribellate genus *Notomatachia*, one of Forster's desids sensu strictu (see Forster 1970: fig. 4). The branched tracheal system has been regarded as a synapomorphy of the superfamily Dictynoidea (Coddington 1990: p. 6), where Desidae is currently placed. Thus, our study confirms that *Naevius* is a dictynoid genus but the hypothesis that it belongs to the same family as *Desis*, first suggested by Lehtinen (1967), cannot be corroborated by this single character.

The two new species herein described present the large movable dorsal tibial apophysis in the male palp, mentioned by Roth (1967) for *N. varius*. The exclusiveness of this character qualifies it as an apomorphy of the genus.

The material examined is deposited in the following collections: Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre (MCN, curator: E. H. Buckup) and Museo de História Natural da Universidade Nacional Mayor de San Marcos, Lima (MUSM, curator: D. Silva D.). The format of descriptions and abbreviations follows Brescovit & Bonaldo (1992). Measurements are in mm.



Figs 1-3. *Naevius zongo*, spec. nov., ♀. 1. Tarsal organ. 2. Tarsal trichobothrium. 3. Leg I, tarsal claws (arrow on unpaired claw).



Figs 4-5. *Naevius manu*, spec. nov, ♂ palp. 4. Ventral view. 5. Retrolateral view.
Fig. 6. *Naevius zongo*, spec. nov, juvenile. Tracheal system, dorsal view. Scale lines: 0.25 mm.

Morphology

Some features, not reported in the original description of the genus, are supplemented here. The tarsal organ is located on distal third of the tarsus and presents an elongate orifice (Fig. 1). The trichobothria occur in two rows on the tibiae and one row on the metatarsi and tarsi; the trichobothrial bases have a subtriangular, elongate plate with a semicircular rim and fine, longitudinal ridges (Fig. 2). The unpaired tarsal claw is almost as long as the paired claws (Fig. 3). The tracheal system of a juvenile of *N. zongo* extends into the cephalothorax and is composed by two strong trunks, each one branching to four lateral tracheoles (Fig. 6). In females of *N. zongo*, the epigynal lips has the posterior internal border folded (Fig. 10). They apparently support the male embolus during copulation. The illustration of the ventral view of the epigynum of *N. varius*, supplied by Roth (1967: pl. 51, fig. 17), suggests that this feature is not an autapomorphy of *N. zongo* and may be shared by all *Naevius* species.

Taxonomy

Naevius manu, spec. nov.

Figs 4, 5

Types. Holotype: ♂, Paucartambo-Pilcopata road, National Park Manu, Cuzco, Peru, Febr. 19. 1990, D. Silva col. (MUSM). – Paratypes: 2♂♂, same data (MUSM, MCN no. 25786).

Diagnosis. *Naevius manu* is a distinctive species, easily recognized by the dilated, almost spherical tibiae of the male palp (Figs 4, 5).

Descripiton

Male holotype. Carapace pale orange; mouthparts orange; sternum yellow; legs pale orange, metatarsi and tarsi darker; abdomen yellow, with white pigmentation; dorsum with small black longitudinal median stripe on anterior third; posterior end of dorsum darkened, with two pairs of black spots; venter with three black longitudinal stripes.

Total length 3.30. Carapace 1.55 long, 1.25 wide. Clypeus 0.12 high. Eye diameters and interdistances: AME 0.05, ALE 0.10, PME 0.11, PLE 0.12; AME-AME 0.03, AME-ALE 0.02, PME-PME 0.08, PME-PLE 0.07, AME-PLE 0.05. MOQ length 0.21, front width 0.15, back width 0.28. Chelicerae with 3 promarginal teeth and 4 retromarginal denticles. Abdomen: 1.70 long.

Leg measurements: I: femur 1.45, patella 0.55, tibia 1.30, metatarsus 1.30, tarsus 0.80, total 5.40. II: 1.30, 0.50, 1.10, 1.20, 0.65, 4.75. III: 1.20, 0.50, 0.85, 1.20, 0.45, 4.20. IV: 1.45, 0.50, 1.10, 1.40, 0.50, 4.95. Leg spination: tibia I d1-0-1, p1-1-1, v2-2-0, r0-1-1. II d1-0-1, p0-1-1, v2-2-0, r0-1-1. III d1-1-0, p0-1-1, v1p-2-2, r0-1-1. IV d1-0-1, p0-1-1, v1p-1p-2, r0-1-1; metatarsus I-IV d1-1-0, p1-1-2, v2-2-1, r1-1-2. Palp: patellae without apophysis; tibiae very dilated, with ventral, apical, bifid apophysis, enlarged at base (Fig. 4) and dorsal, curved movable apophysis, as long as cymbium (Fig. 5). Embolus arising from prolateral side of tegulum. Conductor not enlarged at base, curved, embracing distal third of embolus (Fig. 4).

Female. Unknown.

Variation. Three males: total length 3.25-3.40; carapace 1.55-1.70; femora I 1.40-1.55. The MUSM paratype has only one pair of posterior black dorsal spots on the abdomen. The MCN paratype has a broad black longitudinal stripe on the abdominal dorsum.

Distribution. Known only from the type locality.

Etymology. The specific name is a noun in apposition taken from the type locality.

Material examined. Only the types.

Naevius zongo, spec. nov.

Figs 1-3, 6-10

Types. Holotype: ♂, Vale de Zongo, La Paz, Bolivia, Aug. 05, 1993, A. D. Brescovit col. (MCN No. 25784). – Paratypes: 2♀♀, same data (MCN No. 25785).

Diagnosis. *Naevius zongo* differs from *N. varius* (see Roth 1967: pl. 51, figs 16-18) by the presence of a voluminous, elongated and bifid patellar apophysis on the male palp (Figs 7, 8) and the elongated and large posterior lips of the female epigynum, with a narrow notch on the posterior edge (Fig. 9).

Description

Male holotype. Carapace pale olive, darker at borders and on broad median longitudinal stripe; mouthparts pale olive; legs pale olive, with few dark spots; sternum dark olive; abdomen pale olive, dorsum with black longitudinal median stripe on anterior third and abundant white pigmentation; each side of abdomen with black longitudinal stripe, medially interrupted.

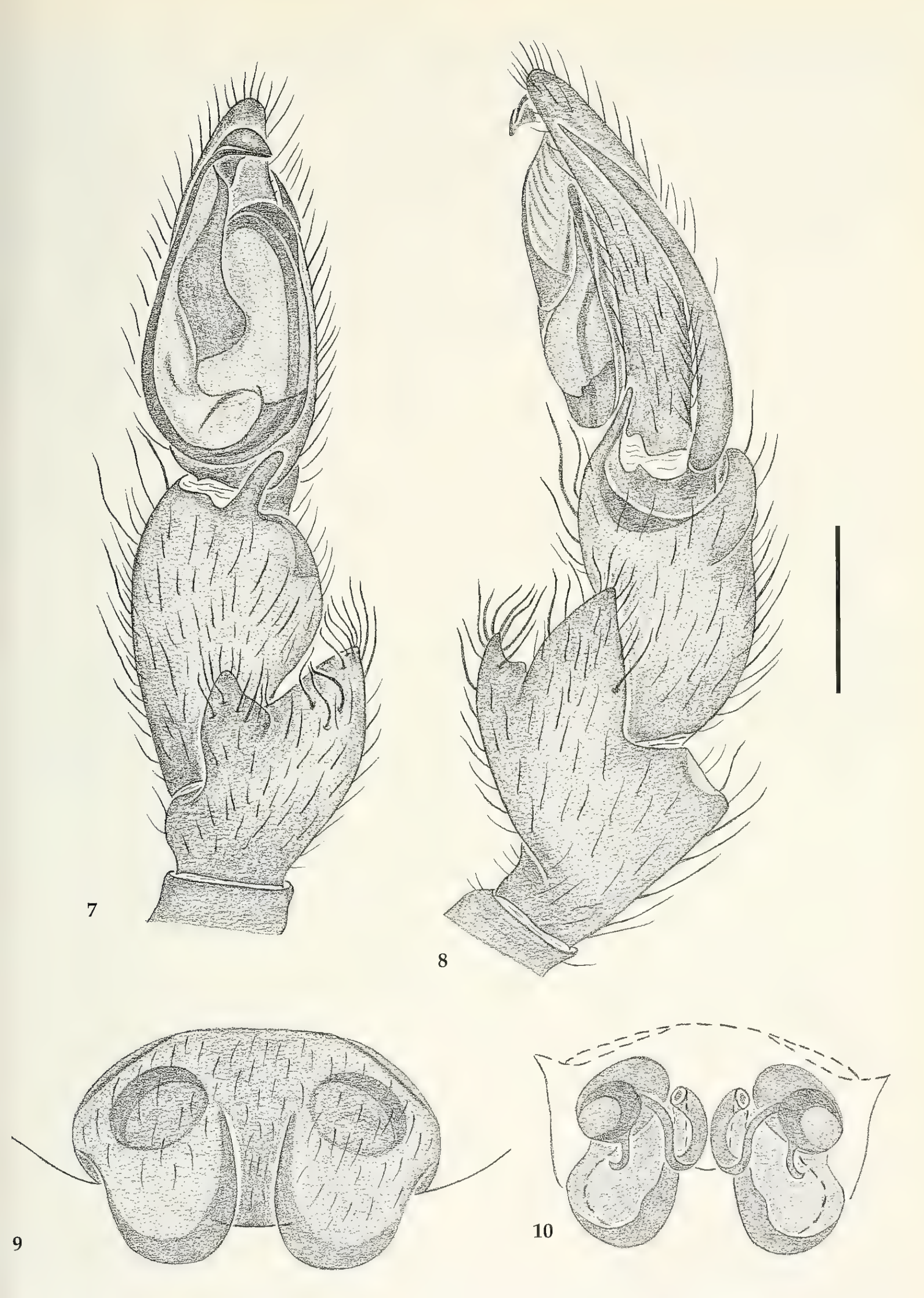
Total length 2.75. Carapace 1.40 long, 1.10 wide. Clypeus 0.12 high. Eye diameters and interdistances: AME 0.03, ALE 0.09, PME 0.11, PLE 0.11; AME-AME 0.03, AME-ALE 0.03, PME-PME 0.08, PME-PLE 0.10, AME-PLE 0.08. MOQ length 0.22, front width 0.11, back width 0.26. Chelicerae with 3 promarginal teeth and 4 contiguous retromarginal denticles. Abdomen 1.50 long.

Leg measurements: I: femur 1.40, patella 0.47, tibia 1.17, metatarsus 1.25, tarsus 0.77, total 5.06. II: 1.10, 0.47, 0,92, 1.10, 0.60, 4.19. III: 0.92, 0.47, 0.72, 1.10. 0.50, 3.71. IV: 1.22, 0.47, 0.87, 1.25, 0.57, 4.38. Leg spination: tibia I d0-1-0, p1-1-1, v0-2-0, r1-1-1. II d1-1-0, p0-1-1, v0-1r-0, r0-1-1. III-IV d0-1-0, p0-1-1, v0-1p-2, r1-1-1; metatarsus: I d0-1-0, p0-1-2, v2-2-2, r0-1-2; II d1-1-0, p1-1-2, v2-2-1, r1-1-2; III-IV d0-1-1, p1-1-2, v2-1-1, r1-1-2. Palp: patella with voluminous, bifid retrolateral apophysis (Figs 7, 8). Tibia with elongated, narrow ventral apical apophysis (Fig. 7); and dorsal, curved movable apophysis, as long as cymbium (Fig. 8). Embolus long, arising from retrolateral base of tegulum. Conductor long, enlarged at base, with hook-shaped tip, embracing distal part of embolus (Fig. 7).

Female paratype. Coloration as in male, except legs with many dark spots and abdomen with predominance of black pigment.

Total length 3.65. Carapace 1.55 long, 1.15 wide. Clypeus 0.10 high. Eye diameters and interdistances: AME 0.06, ALE 0.10, PME 0.11, PLE 0.10; AME-AME 0.03, AME-ALE 0.03, PME-PME 0.08, PME-PLE 0.11, ALE-PLE 0.06. MOQ length 0.22, front width 0.15, back width 0.28. Chelicerae with 3 promarginal teeth and 4 retromarginal denticles. Abdomen 2.20 long.

Leg measurements: I: femur 1.25, patella 0.50, tibia 1.10, metatarsus 1.20, tarsus 0.65, total 4.70. II:



Figs 7-10. *Naevius zongo*, spec. nov. 7-8. ♂ palp. 7. Ventral view. 8. Retrolateral view. 9-10. ♀ epigynum. 9. Ventral view. 10. Dorsal view. Scale lines: 0.25 mm.

1.10, 0.45, 0.85, 1.00, 0.55, 3.95. III: 1.05, 0.40, 0.70, 0.95, 0.45, 3.55. IV: 1.20, 0.50, 0.95, 1.20, 0.55, 4.40. Leg spination: tibia I d1-0-0, p1-1-1, v2-2-0, r0-1-1. II d1-1-0, p0-1-1, v1r-2-0, r0-1-1. III d1-1-0, p1-2-2, v2-2-1, r1-2-2. IV d1-1-0, p0-1-1-1, v0-1p-1p, r0-1-1; metatarsus I d0, p1-2-2, v2-2-1, r1-2-2. II d0-1-0, p1-1-2, v2-2-1, r1-1-2. III d1-1-0, p0-1-1, v0-1p-0, r0-1-1. IV d0-1-0, p1-2-1, v2-2-2, r1-2-2. Epigynum: epigynal plate with elongated and rounded lips, overlaping epigastric furrow, forming narrow notch on posterior edge (fig. 9). Internal border of lips folded. Two anterior oval spermathecae, connected with narrow, sinuous copulatory ducts. Fertilization ducts short, curved (Fig. 10).

Variation. Two females: total length 3.35-3.65; carapace 1.50-1.55; femora I 1.25-1.35.

Natural history. The speciments were collected in small bushes, at an altitude of 3.200 m, in the "humid puna" (for a detailed description of this vegetation, see Morales 1990; for a photographic illustration of the site, see Höfer & Brescovit 1994: pl. 4, fig. c).

Distribution. Known only from the type locality.

Etymology. The specific name is a noun in apposition taken from the type locality.

Material examined. Only the types.

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Study of size relationships and relative growth of *Cestopagurus timidus* (Roux). A method for separating groups

(Crustacea, Decapoda, Anomura)

By **M. E. Manjón-Cabeza & J. E. García Raso**

Manjón-Cabeza, M. E. & García Raso, J. E. (1996): Study of size relationships and relative growth of *Cestopagurus timidus* (Roux). A method for separating groups (Crustacea, Decapoda, Anomura). – Spixiana **19/3:** 239-248

In the relative growth study of the small hermit crab *Cestopagurus timidus* a preliminary classification method, based on those of Lefkovitch (1976) and Noy-Meir (1973), was designed for separing juveniles and adults. This method is interesting when the size-overlap zone of the relative-growth curves of the two phases is large, because there are much specimens (the ones found in the overlap zone) which anatomically are very difficult to know whether are small adults or large juveniles. This method also allows as to recognize the most appropriate structure to differentiate juveniles from adults.

Structures studied, in both sexes, were: the carapace shield, the cheliped, and the male sexual tube. The male cheliped revealed a change of growth rhythm. The growth of all three structures in adults was isometric or slightly allometric, the slope being in females lower than in males.

In males, the puberty size is slightly bigger than in females. It has been established at 1.67 mm of big cheliped length or, about, 1.6 mm of cephalothoracic shield length.

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Introduction

Ideally, growth studies of any species should define and analyze the juvenile and adult phases and show the size or age at which the individuals reach sexual maturity, because growth patterns and puberty sizes of different species differ considerably according to the species life history (Hartnoll 1985, Hartnoll & Gould 1988). It is particularly important to know puberty sizes when studying commercial fisheries.

Most growth studies of Crustacea Decapoda are based on brachyuran species (Hartnoll 1974, 1978, 1982, Mori 1994), but there appears to be little information about Anomura Paguroidea (Bush 1930, Blackstone 1986a, b). This group is difficult to study (Lancaster 1988) because the slightly calcified body and the different sizes and shapes of shells available to, or chosen by, individuals appear to affect their growth and, consequently, the usual measurements of structures like cephalothorax and abdomen do not serve to represent the growth.

The present work reports a study of a population of the small hermit crab *Cestopagurus timidus*, in a *Posidonia oceanica* meadow off southeast Spain where it was the dominant species (García Raso 1990).

Material and methods

The specimens of the small hermit crab *Cestopagurus timidus* (Roux, 1930) came from a well-established *Posidonia oceanica* meadow growing on a sandy bottom with a few rocks off Genoveses beach in the Cabo de Gata-Nijar Natural Park, Almería (S.E. Spain).

Samples were collected by SCUBA divers every two months over two years (1986 and 1987). Depths sampled ranged between three and seven metres. Sample areas were always larger than 900 cm^2 and the rhizome heights were approximately 20 cm (García Raso 1990). In the laboratory the leaves and rhizomes were separated and washed over a three-sieve column; the smallest mesh was 0.5 mm.

The different anatomical structures were analysed by a VID V computer program that processed stereoscopic microscope images of the samples recorded by video camera, measurement error was ± 0.0001 mm. Five parameters were measured: cephalothoracic shield length (CL); cephalothoracic shield width (CW); propodus length of the first ambulatoty leg (cheliped length) (QL); propodus width of the first ambulatory leg (cheliped width) (QW); and the length of the right male sexual tube (TL).

Of the many ways for separing juvenile and adult phases and to define puberty size, the best method uses histological techniques to determine gonad-development states, degrees of maturity and the presence of spermatozoa in the vasa deferentia, but they require either fresh or appropriately-fixed specimens and they have the disadvantage of being destructive.

In the present work the specimens came from collections in which the preservative is alcohol and, also, they must not be destroyed. Thus, other methods had to be used.

For separing females, the simplest was to consider the smallest-sized ovigerous female found as the representative of the first mature size, but this would have been misleading because some eggless females could well be mature and as the presence of ovigerous females in samples would depend more on the time in the annual reproductive cycle at which sampling was carried out. More appropiate is the study of the population during the reproductive period and to consider as the first-mature-size the size at which 50 % of the females examined were ovigerous.

Another method analyses relative growth (Huxley 1924, 1932, 1950, Teissier 1935, 1960, Mayrat 1967, Hartnoll 1974, 1978, 1982; Laird 1965, Laird, Tyler & Barton 1965, Laird, Barton & Tyler 1968, Barton & Laird 1969), especially of sexually dimorphic structures. This method represents the relationships between the chosen parameters, either by the exponential $y = a\, x^b$, or by its logarithmic transformation, $Lg\ y = Lg\ a + b\ Lg\ x$; in which the value of b defines the type of relative growth ($b<1$ is negative allometry, $b=1$ is isometry, $b>1$ is positive allometry). However, there is now criticism of logarithmic transformation (Lovett & Felder 1989).

The relative growth method determines puberty-size indirectly because maturing gonads, ovaries and androgenic glands, begin to secrete hormones that stimulate development of the adult secondary sexual characters that modify the growth curves of their associated parameters, either by making the "moult-discontinuity" more marked, or by changing the slope of the relative growth equation (regression line). The point at which the slope becomes discontinuous or changes direction marks the transition from the juvenile to the adult phase. This method has a five-fold advantage: it can be used for both males and females; the material need not be "fresh"; no special fixing process is required; the specimens need not be from the reproductive period; and, because it can reveal changes in the growth rhythms of the different anatomical structures, it greatly helps the interpretation of behaviour strategies.

The transition step from immaturity to maturity does not take place at the same time in all individuals of a population, that is to say, it may occur at an earlier or later instar. Specimens with the same age may have different sizes and this gives rise to considerable scatter around the mean puberty size; this is the overlap zone in which it is practically impossible to know (using anatomical external feactures) which are small adults or large juveniles. Somerton (1980) suggests a method to identify specimens in the overlap zone that is adopted by other authors like Gaertner & Laloé (1986), but it requires the prior analysis of juveniles or adults outside the overlap.

The classification study reported in this paper is based mainly on that of Noy-Meir (1973) and of Lefkovitch (1976). Both these authors use principal component analysis (PCA) to fit the scattered points of two associated variables. The classification of the variables is carried out subsequently with the help of dendrograms that take into account the locations of the points in the different quadrants and their distance from the Principal Axis I (Pielou 1984).

To classify juveniles and adults in this present work we used the point that marks a change in the

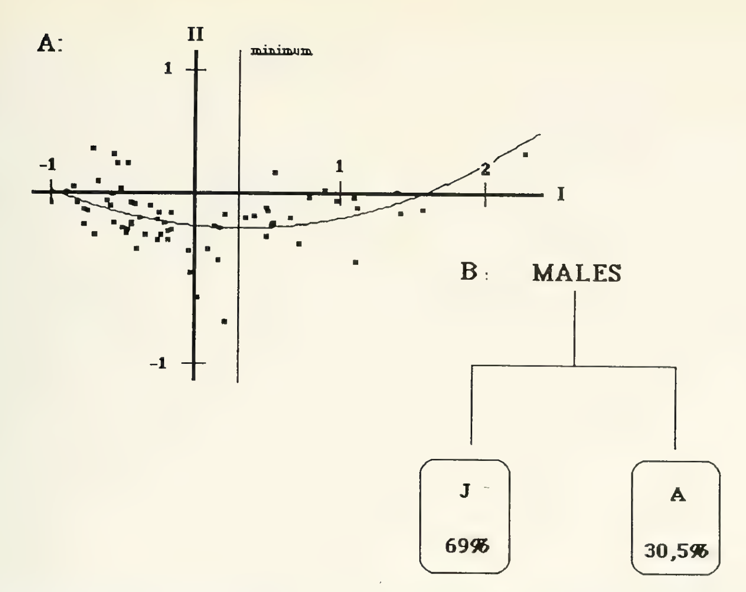


Fig. 1. A. Principal Component Analysis and Polynomial Curve fit in males of *Cestopagurus timidus*. B. Dendrogram resulted of the classification with the minimum.

resultant curve after using principal component analysis, with untransformed data. This point is the maximum or minimum of the curve fitted to the scattered PCA points, but only when the curve is significant. A non-significant curve implies that there is no change of slope of the relative growth of the parameters being tested and that this parameter would be unsuitable to differentiate between juvenile and adult phases.

After this preliminary classification study, we continued to identify the morphological parameter that permitted the best differentiation of juveniles and adults with the greatest certainty, which will be most useful for subsequent growth studies of this species. The best parameter was determined by testing each one against the Principal Axis I and then analysing the resultant correlations and distributions of the scatters in relation with two new theoretical axes. These are defined for each case by taking the minimum value of the fitted curves of the PCA and the value of the variable (parameter) obtained by substituting the minimum value in the equation of the correlations described above.

The distributions of the different scatters are then analysed taking into account their position in the new positive or negative quadrants and this will reveal the morphological parameter that classifies with greatest certainty.

The validity of this method for separing groups was checked by applying it to an analysis of data from previous studies of males of *Alpheus dentipes* Guerin, 1832, in monthly samples of the calcareous seaweed *Mesophyllum lichenoides*. The puberty size found coincided with that given by data from a previous work (Fernández Muñoz & García Raso 1987).

Results

Preliminary classification study

In males (Fig. 1) the polynomial curve that fitted the scatter following principal components analysis of cephalothoracic shield length (CL) against cheliped length (QL) had a 99 % significance. The equation of the resulting curve is $y=0.15x^2-0.10x-0.073$, and the minimum that served as the criterion for classification (Fig. 1B) revealed that 69.5 % of the males were juveniles, while 30.5 % were adults. When the QL and CL variables were analysed with the principal axis I (Figs 2A, 3A), the significant

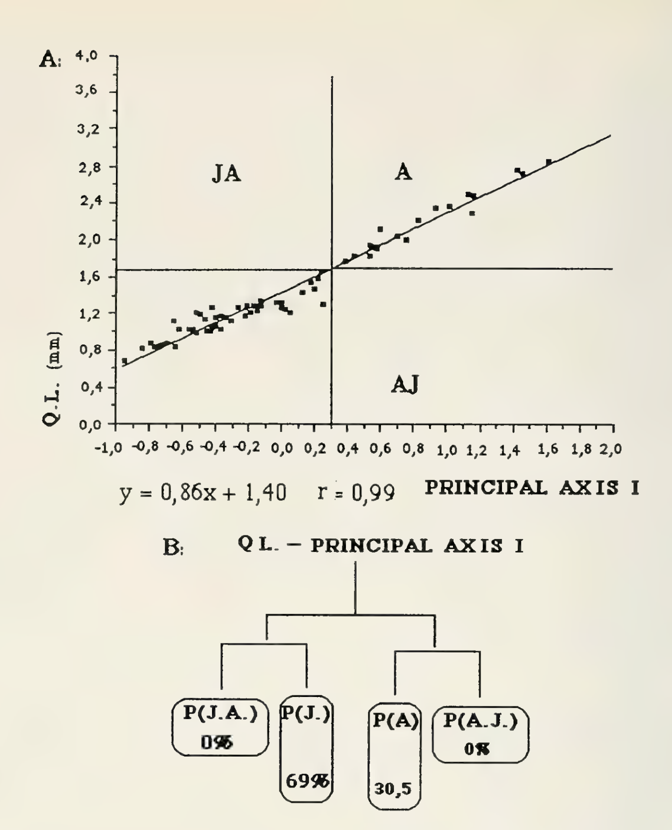


Fig. 2. A. Representation of propodus cheliped length (Q.L.) versus Principal Axis I in *Cestopagurus timidus*. B. Dendrogram obtained by propodus cheliped length (Q.L.). A: Adults, J: Juveniles, A.J.: Adults classificated as juveniles, J.A.: Juveniles classificated as adults.

correlations had a 99 % significance. The above data shows that the error produced by an attempt to classify juveniles and adults by cheliped length (QL) was cancelled (Fig. 2B). However,when cephalothoracic shield length was chosen, the error was greater because 12.4 % of specimens are indeterminate (11 % of juveniles could be classified as adults and 1.4 % of adults as juveniles) (Fig. 3B).

The puberty size in males is reached at 1.67 mm of big cheliped length or, about 1.6 mm of cephalothoracic shield length.

In females (Fig. 4) the curve that fitted the scatter of principal components analysis of cephalothoracic shield length (CL) against cheliped length (QL) is $y=0.22x^2+0.176x-0.0186$, but as r=0.26, and n=40, it was not significant (P> 0.001). Consequently, there was no significant change in the slope of these two parameters to differentiate between juveniles and adults.

Relative growth

Figs. 5-8 give the equations for the relative growth of the parameters analysed.

1. Relationship between cephalothoracic shield length (CL) and cheliped propodus length (QL).

For males, the slopes of the relative growth curves of juveniles and adults were significantly different (Fig. 5A); confidence limits for juveniles were $b=0.52\pm0.007$, and those of adults were $b=1.01\pm0.10$. The coefficient for juveniles revealed negative allometry, while that for adults was isometric.

For females, growth was almost isometric (Fig. 5B). The slope value was $b=0.86\pm0.30$, which is intermediate between those of juvenile and adult males.

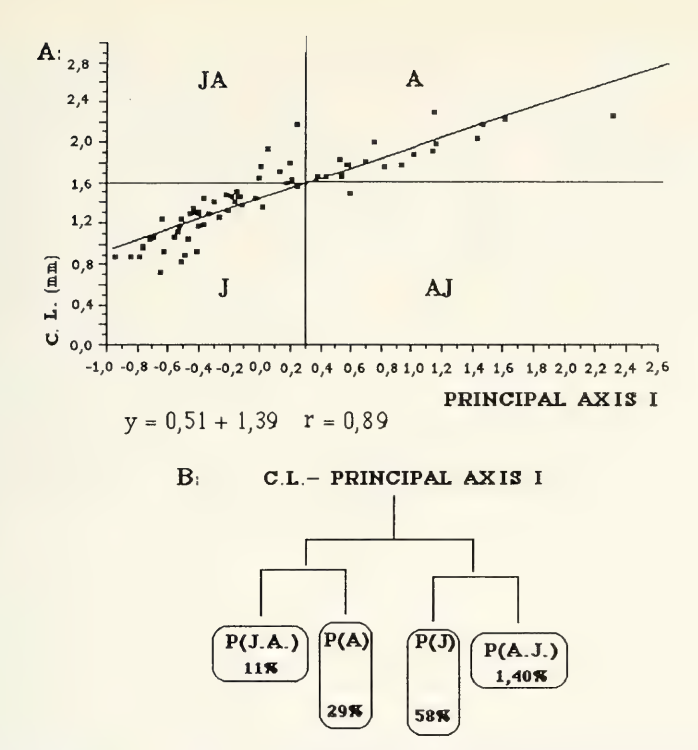


Fig. 3. A. Representation of the cephalothoracic shield length (C.L.) versus Principal Axis I in *Cestopagurus timidus*. B. Dendrogram obtained by cephalothoracic shield length (C.L.). A: Adults, J: Juveniles, A.J.: Adults classificated as juveniles, J.A.: Juveniles classificated as adults.

2. Relationship between propodus length (QL) and propodus width (QW).

For males (Fig. 6A), the slopes of the relative growth curves of juveniles and adults were significantly different, the juveniles had slightly positive allometry ($b=1.14\pm0.51$), while the adults had almost isometric relative growth ($b=0.88\pm0.09$).

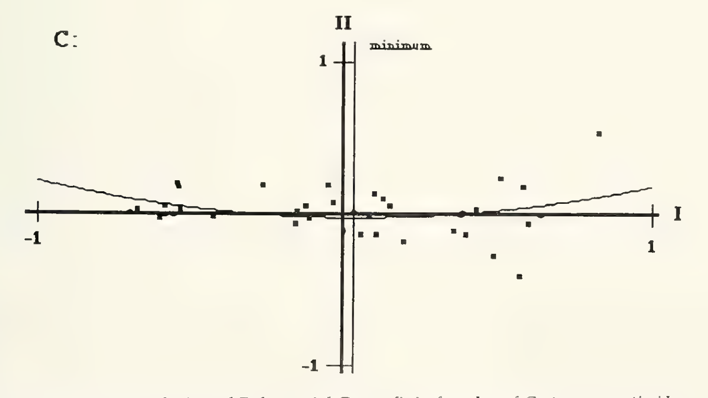


Fig. 4. Principal Component Analysis and Polynomial Curve fit in females of *Cestopagurus timidus*.

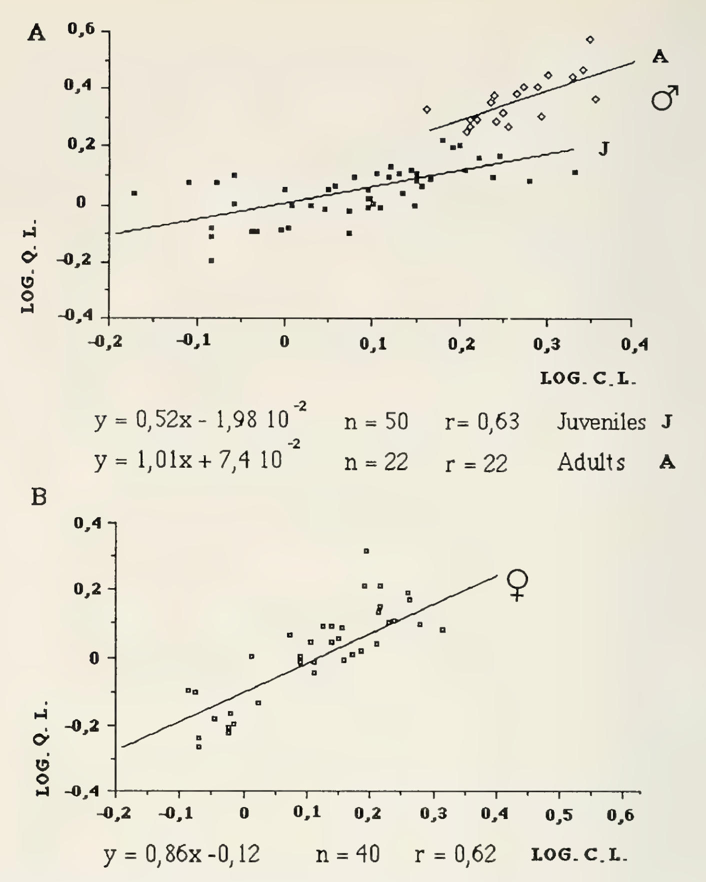


Fig. 5. Logarithmic relationship between cephalothoracic shield length (C.L.) and propodus cheliped length (Q.L.) of *Cestopagurus timidus*. A: Males. B: Females.

For females (Fig. 6B), the value was (b=0.75±0.61) being the slope not significantly different to one of adult males.

3. Relationship between cephalothoracic shield width (CW) and cephalothoracic shield length (CL). No significant differences were found between the growth levels of juveniles and adults (Figs. 7A, 7b). The growth of both sexes was isometric and this indicates that both parameters increase at the same rate. The allometry coefficient for males was b=1.01±0.15 and for female was b=1.11±0.17.

4. Cephalothoracic shield length (CL) against sexual tube length (TL) (Fig. 8B). Relative growth was isometric (Fig 8A); b=1.07±0.75.

Discussion

Somerton (1980) classified those juvenile or adult specimens located within the overlap zone, but in that method, one must first analyse the two non-overlap zones. This is difficult when the overlap is large and the relative growth curves of the clearly-defined juvenile and/or adult phases are short or badly defined. This could be because the size range of the population sample only represents a fraction of the whole population (because of high mortality, adult migration, etc.).

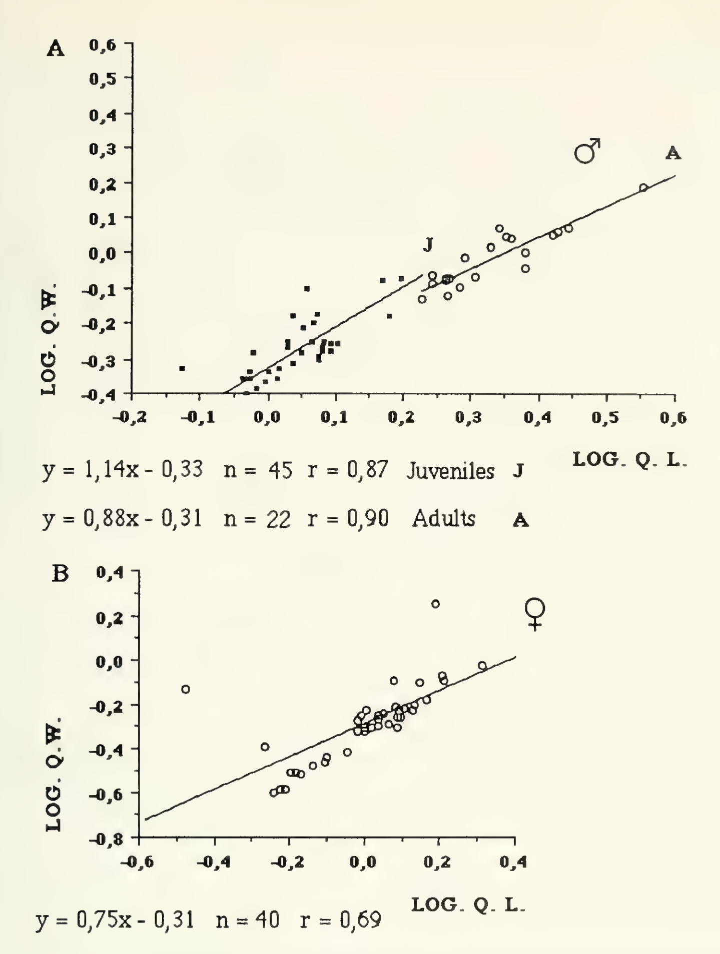


Fig. 6. Logarithmic relationship between propodus length (Q.L.) and propodus cheliped width (Q.W.) of *Cestopagurus timidus*. A: Males. B: Females.

In these cases, it is necessary to carry out a preliminary classification of all the specimens before analysing relative growth because a wrong classification of different specimens, or an insufficient number of them, could greatly distort the slope values.

Connan, Comeau & Moriyasu (1985) and Connan & Comeau (1986) also carried out a principal component analysis, but only as a selection tool to determine the morphological variables (parameters) that best define the changes of their relative growth, particularly of the secondary sexual characters. This method has the advantage of avoiding the arbitraty use of an "a priori" independent variable. Freire and González Gurriarán (1992), just as the latter authors, show that principal component analysis (with a correlation matrix of logarithmically transformed data) permits the analysis of the relations between variables, the changes of relative growths of both sexes, and also helps to define the variables that determine the allometric changes that may be associated with sexual maturity.

Our method is different because it uses PCA analysis only as a preliminary process, for reorientating spatially the scattered distributions, to better identify the minima and maxima (inflexion point) of the polynomial curve derived from analysis of the groups of scatter points to separate clearly juvenile and adult specimens, according to the classical relative growth theory.

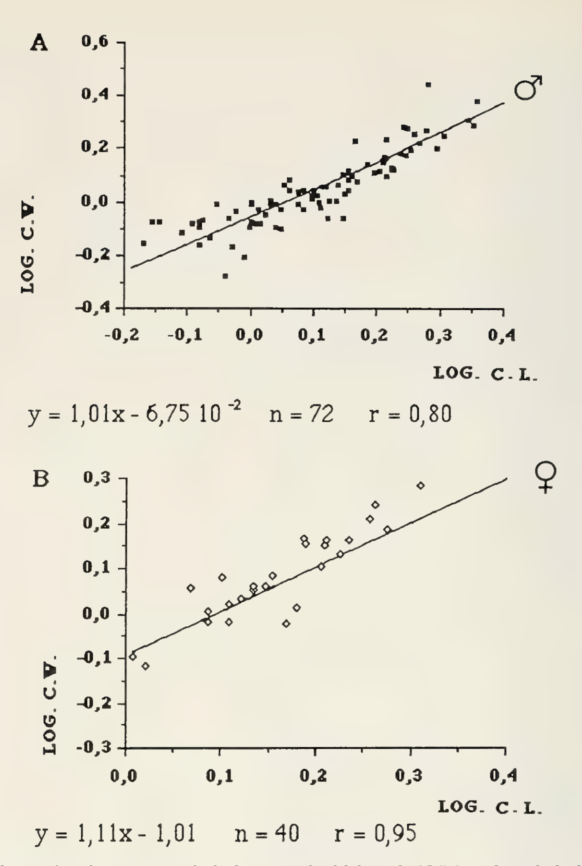


Fig. 7. Logarithmic relationship between cephalothoracic shield length (C.L.) and cephalothoracic shield width (C.W.) of *Cestopagurus timidus*. A: Males. B: Females.

The second step of our method allows us to analyse the different anatomical parameters to determine the most suitable parameter to discriminate between juveniles and adults. On the other hand, it is possible to know the errors that may be generated by this separation. So, in this present work, cheliped length was the best criterion to determine puberty size of males of *Cestopagurus timidus* and it permitted juveniles and adults to be separated without error.

Sexual dimorphism occurs in the the propodus cheliped of many hermit crabs (Bouvier 1940, Zariquiey 1968, etc.) and sometimes this is revealed by the existence of different relative growths (Gherardi 1991). Sexual dimorphism exists in *Cestopagurus timidus*, but, in addition, in adult males the growth rhythm of the cheliped length increases. This has biological significance, probably because it is used in reproduction. A similar pattern is seen in Brachyura (Hartnoll 1982). In females there is no change in the growth rhythm of the cheliped throughout life probably because it is not used specially in reproduction.

The puberty size in females of *C. timidus* were established at 1.25-1.49 mm of cephalothoracic shield length (Manjón-Cabeza & García Raso 1994, Pessani & Premoli 1993), the present study shows that it is bigger in males.

It is particularly interesting that no change was found in the growth rhythm of the length of the male sexual tube, which appears to be unrelated to sexual maturity unlike the relative growths of the sexual pleopods of Brachyura and Caridea (Teissier 1935; Mayrat 1967, Noel 1976, Hartnoll 1985, Fernández Muñoz & García Raso 1987). How does this longcurved "sexual" tube could be used, is unknown.

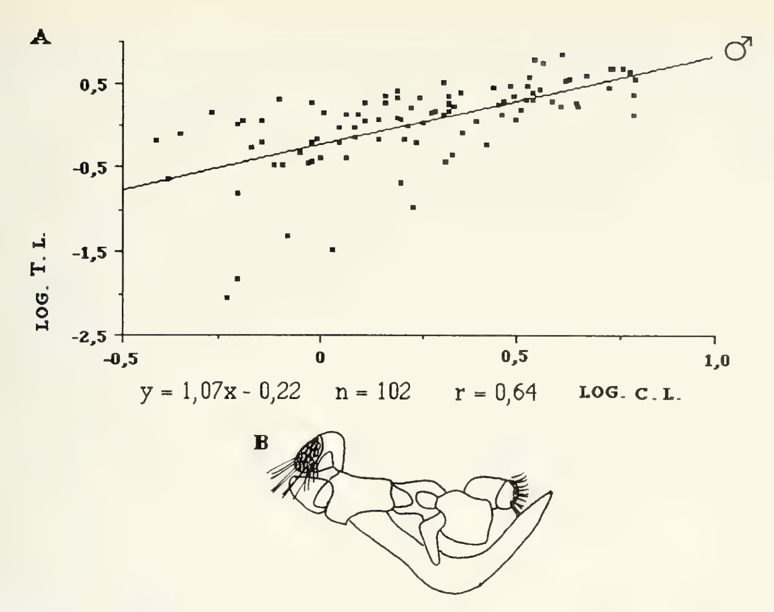


Fig. 8. A. Logarithmic relationship between cephalothoracic shield length (C.L.) and sexual tube length (T.L.) in males of *Cestopagurus timidus*. B. Right sexual male tube of *C. timidus*.

Acknowledgements

The material analysed came from a study of a Posidonia oceanica bed that was supported by project PR84-0401-CO2-01 of the C.A.I.C.Y.T. The authors also wish to thank Dr. Raimundo Real for helping with the statistical work and Mr. David W. Schofield for his helpful suggestions while editing the manuscript.

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Ein bisher unbekannter *Naboandelus* Distant aus dem Irak

(Insecta, Heteroptera, Gerridae)

Von **Herbert Zettel**

Zettel, H. (1996): A so far unknown *Naboandelus* Distant from Iraq (Insecta, Heteroptera, Gerridae). – Spixiana **19/3:** 249-251

Naboandelus bergevini orientalis, subspec. nov. is newly described from Iraq. The new subspecies is the most northeastern population within the Ethiopian and South-Palearctic area of the species.

Dr. Herbert Zettel, Naturhistorisches Museum, 2. Zoologische Abteilung, Burgring 7, A-1014 Wien, Österreich.

Einleitung

Die zur Unterfamilie Trepobatinae gehörende Gattung *Naboandelus* Distant, 1910, ist in zehn Arten und einigen Unterarten in der äthiopischen Region verbreitet. In Nordostafrika erreicht sie die südliche Paläarktis und kommt von hier ausgehend weiter bis Israel und Arabien vor. In einem zweiten – soweit bisher bekannt isolierten – Verbreitungsgebiet von Indien und Borneo ist die Gattung in vier weiteren Arten vertreten (Polhemus & Polhemus 1994). Der hier beschriebene Erstnachweis aus dem Irak stellt das nordöstlichste Vorkommen im äthiopisch-paläarktischen Verbreitungsgebiet dar.

Das Material der hier neu beschriebenen Unterart des *Naboandelus bergevini* Bergroth, 1911, ist mir zusammen mit anderen interessanten, vor allem orientalischen Gerriden von der Zoologischen Staatssammlung München zur Bearbeitung überlassen worden. Ich danke dafür aufrichtig dem Kurator der Heteropterensammlung, Herrn Dr. K. Schönitzer.

Naboandelus bergevini ist in Afrika und im Vorderen Orient weit verbreitet. Bisher sind vier Unterarten beschrieben, die wie folgt verbreitet sind (nach Linnavouri 1971, 1975, 1981):

N. b. bergevini Bergroth, 1911	Ägypten, Libyen
N. b. popovi Brown, 1951	Israel, Arabien, Kongo
N. b. pygmaea Linnavouri, 1971	Sudan
N. b. bouakeanus Linnavouri, 1975	Elfenbeinküste, Nigeria, Burkina [Obervolta], Togo, Benin [Dahomey], Tschad, Kamerun

Naboandelus bergevini ist vor allem durch zwei Merkmale des ♂ gekennzeichnet, dem Fehlen eines Zahnes am Profemur und der Form des Proctiger, dessen Seitenflügel stärker als bei den anderen Arten divergieren (Linnavouri 1981). Seine Unterarten sind nach Körpergröße, Gestalt, Färbung und geringen Abweichungen in der Form der Seitenflügel des Proctiger beschrieben. Die Unterschiede in der äußeren Morphologie sind teils recht erheblich. Da bisher die inneren Genitalstrukturen für die Artdiagnose meist nicht berücksichtigt worden sind (nur Brown 1951 skizziert die Vesikula), ist es nicht auszuschließen, daß es sich bei den genannten Unterarten tatsächlich sogar um Arten handelt. Da dem Autor derzeit keine ♂♂ der anderen Subspezies vorliegen, kann dies jedoch vorerst nicht Gegenstand der Untersuchung sein.

Naboandelus bergevini orientalis, subspec. nov.

Typen: Holotypus (apteres ♂), Paratypen (19♂♂ und 30♀♀, alle apter) und 11 Larven unterschiedlicher Stadien: "Irak / Chabaish / 28.6.1980 / Coll. Weber" (in der Zoologischen Staatssammlung München, 3♂♂, 4♀♀ im Naturhistorischen Museum Wien).

Beschreibung

Größe der apteren Formen (Angaben in mm): ♀♀ konstant größer als ♂♂. Körperlänge der ♀♀ 2.00-2.44 (∅ = 2.29), der ♂♂ 1.79-1.97 (∅ = 1.90); Körperbreite (gemessen an der Basis der Mesacetabula) der ♀♀ 1.04-1.18 (∅ = 1.11), der ♂♂ 0.84-0.91 (∅ = 0.88).

Apteres ♂. Färbung schwarz, ohne metallischen Glanz; hell gelb sind die Ventralseite des Kopfes und des Prothorax, ein schmal U-förmiger Fleck dorsal am Kopfhinterrand und entlang der Augenränder, ein runder Fleck am Pronotum, ca. ²⁄₅ des 1. Antennengliedes, alle Coxen und Trochanteren, die Basis des Profemur, mehr als die Hälfte des Mesofemur, die letzten Abdominalsternite, der Hinterrand des 7. Tergits und das 8. Tergit mit Ausnahme der Mitte; Beine überwiegend dunkelbraun.

Gestalt schlank; Synthlipsis 2.0mal so breit wie die maximale Breite des Auges; Längenverhältnis der Antennenglieder wie 1.4 : 1 : 0.9 : 0.9; 4. Glied etwas verbreitert (Abb. 2); Pronotum 0.9 × so lang wie das Auge; Mesonotum 2.9-3.2 × so lang wie das Pronotum; Mesothorax ohne schwarze Borsten; Profemur viel länger als Protibia, ohne Zahn oder Vorsprung an der Basis, distad allmählich verschmälert (Abb. 1); Metatarsalglieder verschmolzen; relative Längen der Beinglieder siehe Tabelle 1.

Genitalia. Pygopgor gestreckt oval; Proctiger mit langen, relativ schlanken und divergierenden Seitenflügeln (Abb. 3); Vesicula (Abb. 4, 5): Dorsalsklerit schlank, stark sklerotisiert, distal wenig divergierend, die basalen Äste ventral jeweils gegabelt; Lateralsklerite schlank, stabförmig, distal konvergierend; außen an der Vesicula ein Feld aus kleinen, länglichen Chitinstrukturen.

Apteres ♀. Gestalt breiter als beim ♂, jedoch wesentlich schlanker als bei den anderen Unterarten; Färbung ähnlich wie beim ♂, aber die gesamte Ventralseite außer den vorderen, lateralen Bereichen des Mesosternum und dem Metasternum hell gelb; Pronotum 0.8 × so lang wie das Auge; Mesonotum 3.7-4.0 × so lang wie das Pronotum; Mesothorax lateral und dorsal spärlich mit schwarzen Borsten besetzt; Profemur schlanker als beim ♂; relative Längen der Beinglieder siehe Tabelle 1; Connexiva bis zum 4. Segment stark konvergierend (nicht bei stark eigefülltem Abdomen), dahinter parallel; Connexivum am 6. Segment ohne längere Haare; 7. Sternit groß, lateral hochgezogen, dadurch von hinten betrachtet halbkreisförmig ausgeschnitten.

Makroptere Formen unbekannt.

Differentialdiagnose. Die Unterarten *bergevini* s.str., *bouakeanus* und *popovi* sind wesentlich größer und breiter als *orientalis*, subspec. nov., vor allem die ♀♀ sind von sehr robuster Körpergestalt: Aptere ♀♀ von *bouakeanus* sind 2.75-3.0 mm lang, von *popovi* etwa von der gleichen Größe (2.7-3.0 mm, nach Brown 1951); drei vom Autor untersuchte, aptere ♀♀ von *bergevini* s.str. sind 2.60-2.86 mm lang und 1.62-1.66 mm breit. Die ♀♀ von *bouakeanus* und *popovi* haben am Mesonotum einen bzw. zwei gelbe Flecke, ♀♀ und ♂♂ von *bouakeanus* zeigen deutlichen metallischen Glanz (Linnavouri 1975). Die Meso- und Metafemora von *bergevini* s. str. sind schwarzbraun. Die Seiten des Mesothorax sind bei den ♀♀ von *bergevini* dichter, schwarz beborstet. Die Lateralflügel des Proctiger von *bouakeanus* sind sehr schlank.

Sehr ähnlich ist der neuen Unterart *N. b. pygmaeus* aus dem Sudan. Bei gleicher Körperlänge sind die ♀♀ von *pygmaeus* jedoch auffällig breiter (1.25 und 1.26 mm bei zwei untersuchten Paratypen), die

Tab. 1. Längen der Beinglieder (Femur, Tibia und Tarsus) im Verhältnis zur Länge des Mesofemur (= 100) bei ♂ und ♀ von *N. b. orientalis*, subspec. nov.

		Femur	Tibia	Tarsus 1	Tarsus 2
Vorderbein:	♂:	50	33	4	13
	♀:	44	30	4	14
Mittelbein:	♂:	100	117	44	38
	♀:	100	144	47	32
Hinterbein:	♂:	112	46	23	–
	♀:	110	47	22	–

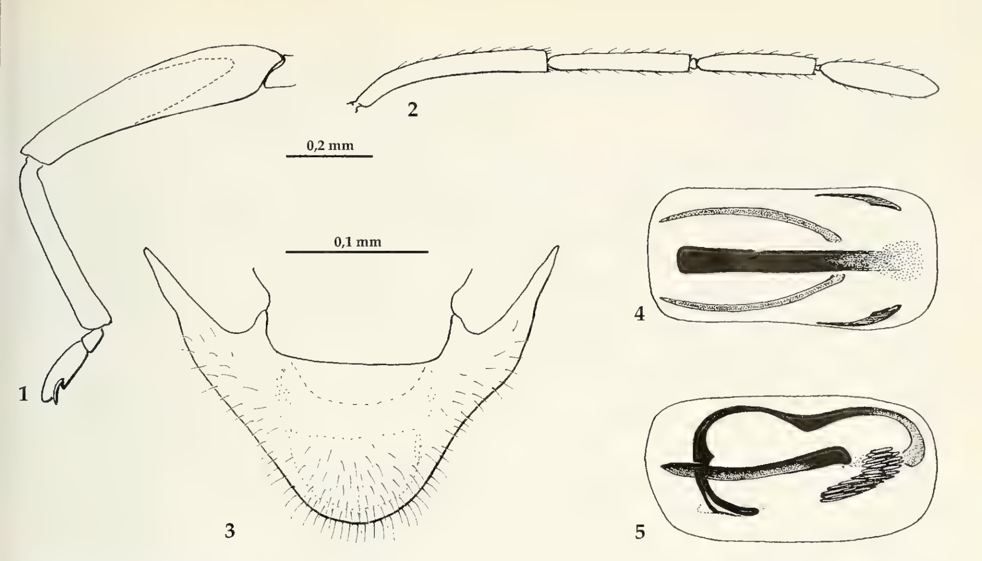


Abb. 1-5. *Naboandelus bergevini orientalis*, subspec. nov. ♂. 1. Vorderbein. 2. Antenne. 3. Proctiger. 4. Vesicula, dorsal. 5. Vesicula, lateral.

Unterseite der ♀♀ ist schwarz (Mesosternum und Sternite weitgehend gelb bei *orientalis*, subspec. nov.), Seiten und Notum des Mesothorax der ♀♀ sind dicht beborstet (sehr spärlich beborstet bei *orientalis*). Als differentialdiagnostisch wichtig ist ein Büschel mediad gerichteter Haare am Connexivum 6 der ♀♀ von *pygmaeus* anzusehen, das bei *orientalis* fehlt.

Die sklerotisierten Strukturen der Vesikula von *orientalis* sind ähnlich den von Brown (1951) für *popovi* abgebildeten. Es scheint jedoch bei *orientalis* das Lateralsklerit schlanker und das Dorsalsklerit kaudal schwächer ausgebildet zu sein. Das Feld mit den länglichen Chitinstrukturen (vgl. Abb. 5) wird bei Brown (1951) als einheitliches Sklerit abgebildet.

Zur Klärung der Unsicherheiten in der taxonomischen Bewertung der afrikanischen Arten und Unterarten wäre eine genaue Analyse der genitalen Feinstrukturen erforderlich.

Zusammenfassung

Naboandelus bergevini orientalis, subspec. nov. wird aus dem Irak beschrieben. Die neue Unterart ist die nordöstlichste Population der Art innerhalb ihres äthiopisch-südpaläarktischen Verbreitungsgebietes.

Literatur

Brown, E. S. 1951. Aquatic and semiaquatic Hemiptera. - British Museum Expedition to South-West Arabia 1951: 221-273

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Polhemus, J. T. & Polhemus, D. A. 1994. The Trepobatinae (Heteroptera: Gerridae) of New Guinea and surrounding regions, with a review of the world fauna. Part 2. Tribe Naboandelini. - Ent. scand. **25**: 333-359

23. Nielsen, C.: Animal Evolution. Interrelationships of the Living Phyla. - Oxford University Press, Oxford, New York, Tokyo, 1995. IX + 467 pp. ISBN 0-19-854868-0 (hbk), ISBN 0-19-854867-2 (pbk).

In 1979 Claus Nielsen published a forerunner of his "Trochaea-Theory" (Fortschr. zool. Syst. Evolutionsforsch. 1: 178-184), which was formally proposed in 1985 (Biol. J. Linn. Soc. 25: 243-299) and was extended and specified in 1987 (Acta Zool. Stockh. 68: 205-262). The present volume outlines this theory in detail and also adds new ideas on animal evolution. The book is divided into 56 chapters comprising the choanoflagellates (the probable sister group of Metazoa), the proposed major clades and all metazoan phyla - whatever a phylum should be: Echiura is considered as an order (?), whereas Vertebrata is regarded as a phylum proper. The arrangement of chapters follows the author's phylogenetic proposal, which differs significantly from the traditional arrangement found in current textbooks. Each chapter contains a short description of the clade or phylum, discusses controversial points of view, and also provides a specific reference list. A detailed glossary finishes the volume.

Several phylogenetic trees are provided, which are usually presented in the classic Hennigian style with the proposal synapomophies at the respective nodes of the tree. A remarkable exception is the "tree" of annelids in the broadest sense, where Gnathostomulida, Pogonophora (Frenulata & Vestimentifera), Lobatocerebridae, Myzostomida, Echiura (all united in a paraphyletic taxon 'Polychaeta'!), and Clitellata raise independently out of a pre-annelidan "dust" - in my view an entirely unnecessary and misleading concept. Computer aided methods have not been provided and also an overall character-matrix is not presented. The results of molecular sequencing are only briefly mentioned, but no attempt has been made to compare the molecular results in detail with the phenotypic ones.

Despite these shortcomings and regardless whether or not one (at least partly) shares Nielsen's point of view on animal evolution, this book is a must for everybody who is interested in the subject. A lot of interesting information is provided, and fine tables or drawings compare certain features of high phylogenetic significance. In particular the low price of the paperback edition should encourage all interested people to buy this book. G. Haszprunar

24. Sierra, A. G.: Mollusca - Cephalopoda. Fauna Iberica Vol. 1 (Ramos, M. A. ed.). - Museo Nacional de Ciencias Naturales Consejo Superior de Investigaciones Cientificas, Madrid, 1992. 327 pp., 19 colour photos. ISBN 84-00-07267-7.

As described in the preface, this volume is the first modern synthesis about cephalopod molluscs in the Iberian Peninsula and Balearic Islands. Nearly 100 species of 33 families are treated in a very accurate and professional way: Identification keys, careful and detailed descriptions and very fine drawings of each species as well as information about geographical distributions and biology are provided. An appendix with 19 colour photos show these wonderful creatures alive. The author did a very fine piece of work. Besides the Iberian Peninsula the volume will be useful and applicable for the whole western Mediterranean and the temperate east Atlantic. The text is in Spanish (therefore I cannot comment on typing-errors), but with some knowledge on the animals, reminding of school Latin and a small dictionary application takes place without problems. The systematic part has been reviewed very carefully, and also a complete synonymy list is provided as an appendix. The drawings are nice and clear, showing the whole animal, details of the hectocotylus, and anatomical features in the case of the Sepiolidae, which are otherwise difficult to determine. Needless to state that also the reference list is of high quality. Summing up, although in Spanish, the cephalopod volume of the Fauna Iberica can be recommended to everybody who is interested in cephalopod systematics, biology or biogeography. It is to hope that also further volumes of the series will continue the present high standard. G. Haszprunar

25. Hartwich G.: Die Tierwelt Deutschlands, 68. Teil: II. Strongylida: Strongyloidea und Ancylostomata. - Gustav Fischer Verlag, Stuttgart, Jena, 1994. 157 S.

Der hier vorliegende, zweite Teil über parasitische Nematoden der Wirbeltiere setzt den ersten Teil (Tierwelt Deutschlands, 62. Teil, 1975) nach fast 20-jähriger Lücke fort. Hauptziel ist es, Bestimmungsschlüssel und Diagnosen dieser auch für die Veterinärmedizin wichtigen Gruppen darzulegen, während biologische oder phylogenetische Aspekte untergeordnete Bedeutungen haben. Es ist das Verdienst des Autors, die teilweise sehr alte und häufig sehr schlecht zugängliche und fremdsprachige Literatur zusammengefaßt und in einer übersichtlichen Form dargeboten zu haben. Der Aufbau folgt der derzeitigen Systematik, die Artbeschreibungen und Bestimmungsschlüssel sind detailliert, die Zeichnungen meist klar und instruktiv. Leider wurde darauf verzichtet, bestimmte Merkmale durch rasterelektronenmikroskopische Aufnahmen noch "wirklichkeitsnäher" darzustellen.

Eindeutig negativ zu beurteilen ist der unverhältnismäßig hohe Preis des Bandes, der weder in der Hülle (broschiert), Seitenzahl (157) noch Ausstattung (ausschließlich Strichzeichnungen) seinen Widerhall findet. Damit wird die Verbreitung dieses Bandes wohl auf Bibliotheken, welche die gesamte Reihe abonniert haben, und direkt betroffene Fachleute beschränkt bleiben. G. Haszprunar

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The Australian ground beetle genus *Porocara* Sloane. Second revision

(Insecta, Coleoptera, Carabidae, Odacanthinae)

By **Martin Baehr**

Baehr, M. (1996): The Australian ground beetle genus *Porocara* Sloane. Second revision (Insecta, Coleoptera, Carabidae, Odacanthinae). – Spixiana **19/3:** 253-265

The Australian odacanthine genus *Porocara* is revised again based on newly collected and detected material from the northern parts of the Northern Territory and Western Australia. *P. ulrichi*, spec. nov. is described and the closely related species *P. occidentalis* Baehr, *P. nigricollis* Baehr and *P. punctata* Sloane are newly defined. For the population of *P. punctata* that inhabits far Northern Territory a new subspecies *P. punctata arnhemensis*, subspec. nov. is described. In the tropical parts of the Northern Territory and of Western Australia the genus forms an assemblage of extremely closely related, commonly syntopic taxa that are very similar in external morphology and habits, though are mainly defined by differences in their genitalic characters. The coexistence of up to three species in northern and northwestern Australia is the result of repeated colonizations of the northern and western refugia by *Porocara* stocks during late ice-age, and of subsequent isolation and speciation of these populations.

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Introduction

The odacanthine genus *Porocara* was erected by Sloane (1917) for the unique species *P. punctata* Sloane that was then known only from the lower Cape York Peninsula in North Queensland. Despite of the large type series collected by Sloane, this species has been rarely recollected since description. My revision of the genus (Baehr 1986) was mainly based on material collected by me in the far Northern Territory and in northwestern Australia and on the moderately rich material of the ANIC, Canberra. Therein I described three new species from far Northern Territory and from different parts of northwestern Australia, and an additional new subspecies of *P. punctata* from the Kimberleys. During a recent collecting trip to the same areas I collected again many specimens of *Porocara* in different localities and found another new species in the northwestern part of the Northern Territory that occurs syntopic with populations of *P. punctata kimberleyana* Baehr and in some localities was found even in the same Barber traps. Although the new species is externally extremely similar to *P. punctata*, the aedeagus is quite different.

Based on material from the western escarpment of Arnhem Land, loaned from the Northern Territory Museum (MNTD), a new subspecies of *P. punctata* is described that coexists with *P. nigricollis* Baehr, which means that *P. punctata* extends from north Queensland through far Northern Territory to the Kimberleys in far northern Western Australia. In this vast area, *P. punctata* is syntopic with three different species in different parts of its range as tabulated below (see tab. 2). This common syntopic occurrence of two, in one locality even of three species is rather surprising in species with extremely similar external morphology that most probably have a very similar way of life.

Main differentiating characters of the taxa are in the male genitalia, but even the externally most similar taxa show faint though rather constant differences in shape of pronotum, shape and relative length of elytra, density of puncturation of pronotum, and degree of microreticulation of elytra. As a consquence, all species can be distinguished without regarding of genitalic characters, when comparison with related species is possible.

Unlike typical odacanthine beetles, species of *Porocara* live in pure wet sand of rivers and larger creeks near water, where during daytime they are buried in the sand or under stones and boulders. At night they come out of their holes to forage around the pools. I never found them in dry river or creek beds far away from water. The yellow or light reddish colouration matches very well the colour of the sand, and the elytral pattern is in all species rather inconspicuous, except for fully coloured specimens of *P. nigricollis*, and it serves as a purpose to obscure the body shape. Only in *P. nigricollis* of far Northern Territory that is a species of the full wet tropical zone the colour pattern is more accentuate and may be regarded an example of Gloger's rule.

Material

This second revision is based on altogether 90 additional specimens representing 5 taxa (excluding *P. p. punctata* and *P. glabrata*) from my own recent collections in far northern and northwestern Australia, my collections in the Hamersley area in 1987, the Museum and Art Gallery of the Northern Territory, Darwin, and a small collection from northwestern Australia kindly received from Miss S. Hogenhout, Leiden.

Revised key to the species of *Porocara* Sloane

This key refers partly to the key in my previous revision (Baehr 1986). Figures from that revision are labelled **B86**.

1. Surface of pronotum and posterior part of head impunctate or nearly so. Postmedian vitta of elytra narrow, conspicuously serrate and sinuate (**B86**, fig. 4). Apex of aedeagus virtually not thickened (**B86**, fig. 9). Southeastern margin of Kimberley Division, northwestern Australia ... *glabrata* Baehr
– Surface of pronotum and posterior part of head coarsely punctate. Postmedian vitta of elytra wide, less serrate and sinuate (**B86**, figs 1-3). Apex of aedeagus more or less thickened (Figs 1-3, 11, 13). Northern tropical parts of Australia from Queensland to Western Australia .... 2.

2. Aedeagus smaller and shorter, length <1.8 mm, apex less upturned and barely curved to right side (Figs 1-3, 10). Elytra shorter, laterally less regularly rounded (Figs 14-17). Basal part of lateral borders of pronotum more abruptly sinuate (Figs 4-7) .... 3.
– Aedeagus larger and longer, length >2.2 mm, apex markedly upturned and curved (Figs 11, 13). Elytra longer, laterally more regularly rounded (Figs 18, 19). Basal part of lateral borders of pronotum not abruptly sinuate (Figs 8, 9) .... 6.

3. In fully coloured specimens prothorax, vertex, and most of lower surface black; in teneral specimens at least part of proepipleurae and base of head darker than remaining parts. Elytra markedly square, with accentuate shoulders, lateral margins almost parallel (Fig. 17). Microsculpture of elytra very conspicuous, at 10x magnification seemingly isodiametric. Lower surface of aedeagus gently curved, apex rather elongate, not turned down (Fig. 10). Far Northern Territory . *nigricollis* Baehr
– Even in fully coloured specimens prothorax, vertex, and most of lower surface not darker than remainder. Elytra not square, with less accentuate shoulders, lateral margins perceptibly convex (Figs 14-16). Microsculpture of elytra less conspicuous, at 10x magnification distinctly transverse. Lower surface of aedeagus gently or markedly curved, apex short or elongate, but when elongate, then apex turned down or aedeagus markedly curved (Figs 1-3) .... 4.

4. Pronotum more densely and regularly punctate, basal part of lateral borders less abruptly sinuate (Figs 4, 6). Aedeagus more compact, apical part at orificum (as seen from below) distinctly widened, lower surface gently or markedly concave, but when gently concave, then apex short (Figs 1, 3). North Queensland, far Northern Territory .... 5.

– Pronotum less densely and regularly punctate, basal part of lateral borders abruptly sinuate (Fig. 5). Aedeagus more delicate, apical part at orificum (as seen from below) barely widened, lower surface gently concave, apex elongate (Fig. 2). Northwestern part of Northern Territory to northwestern Australia north of Great Sandy Desert .... *punctata kimberleyana* Baehr

5. Elytra shorter, more square, ratio l/w <1.58 (Fig. 14). Lower surface of aedeagus gently concave, apex short, less club-shaped, almost straight (Fig. 1). Northern Queensland .... *punctata punctata* Sloane

– Elytra longer, more egg-shaped, ratio l/w >1.62 (Fig. 16). Lower surface of aedeagus markedly concave, apex longer, distinctly club-shaped, pointed down (Fig. 3). Arnhem Land, far Northern Territory .... *punctata arnhemensis*, subspec. nov.

6. Pronotum rather densely punctate. Basal lobe of aedeagus less curved, apex more upturned though less asymmetric, lower surface of aedeagus barely striate (Fig. 11). Northwestern part of Northern Territory, adjacent northern Western Australia .... *ulrichi*, spec. nov.

– Pronotum rather sparsely punctate. Basal lobe of aedeagus more curved, apex less upturned though more asymmetric, lower surface of aedeagus conspicuously striate (Fig. 13). Northwestern Australia south of Great Sandy Desert .... *occidentalis* Baehr

Porocara punctata Sloane

Sloane, 1917, p. 416; Csiki 1932, p. 1537; Baehr 1986, p. 719.

Diagnosis. Distinguished by slightly rounded, moderately to rather elongate elytra, absence of black colour on head and pronotum, and small aedeagus with moderately elongate, slightly thickened apex.

Distribution. The whole of tropical northern Australia from Queensland to the Kimberleys.

Porocara punctata punctata Sloane
Figs 1, 4, 14, 20

Sloane, 1917, p. 416; Csiki 1932, p. 1537; Baehr 1986, p. 719.

Diagnosis. Distinguished from the other subspecies of *P. punctata* by rather short and wide elytra (Fig. 14), rather dense puncturation of pronotum, less markedly divergent basal angles of pronotum (Fig. 4), and aedeagus with rather straight lower surface and short apex (Fig. 1).

Additional distinguishing character states

Ratio length / width of elytra: 1.55-1.58.

♂ genitalia (Fig. 1). Genital ring comparatively wide, laterally convex. Aedeagus small, <1.8 mm long, gently curved, lower surface almost straight, apex short, thickened, gently turned to right side, orificium with a fold at apex. Right paramere fairly elongate.

Distribution (Fig. 20). Eastern subspecies distributed through North Queensland from the middle of the Cape York Peninsula west to Normanton and south to about Mackay.

Habits. Lives in wet sand near rivers and creeks like other species of this genus.

New records: No new material recorded.

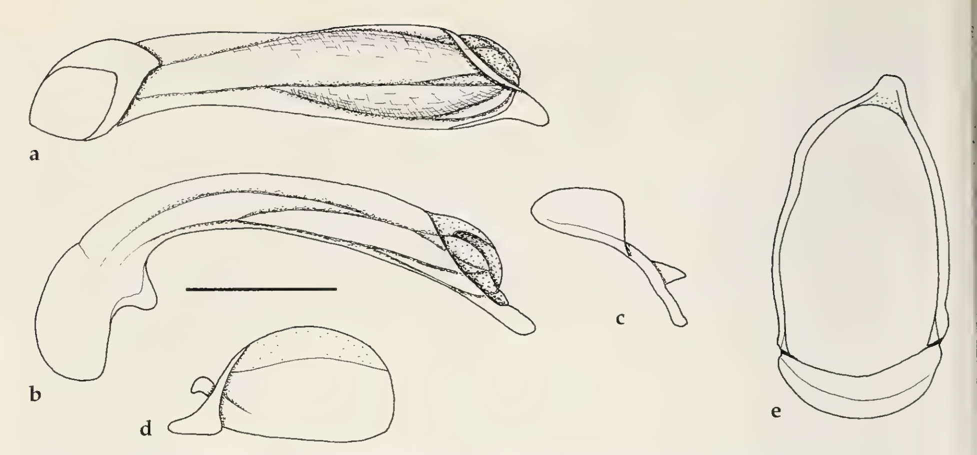


Fig. 1. *Porocara punctata punctata* Sloane. ♂ genitalia. a. Aedeagus, left side. b. Aedeagus, lower surface. c. right paramere. d. left paramere. e. Genital ring (not to scale). Scale: 0.5 mm.

Porocara punctata kimberleyana Baehr
Figs 2, 5, 15, 20

Baehr, 1976, p. 721.

Diagnosis. Distinguished from the other subspecies of *P. punctata* by moderately elongate elytra (Fig. 15), markedly divergent basal angles of pronotum (Fig. 5), and aedeagus with rather straight lower surface and elongate apex (Fig. 2).

Additional distinguishing character states

Ratio length / width of elytra: 1.62-1.64.

♂ genitalia (Fig. 2). Genital ring comparatively wide, laterally convex. Aedeagus small, <1.8 mm long, gently curved, lower surface slightly concave, apex fairly elongate, thickened, gently turned down and to right side, orificium with a fold at apex. Right paramere fairly elongate.

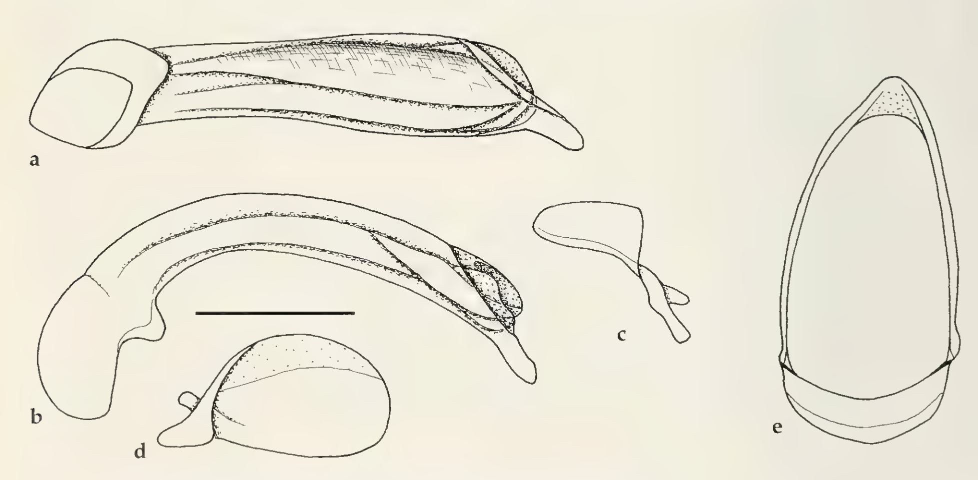


Fig. 2. *Porocara punctata kimberleyana* Baehr. ♂ genitalia. For legend see Fig. 1.

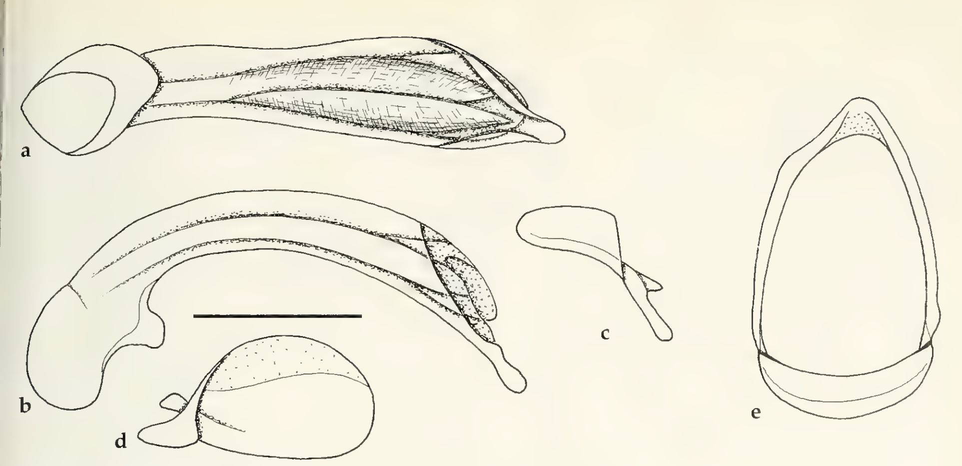


Fig. 3. *Porocara punctata arnhemensis*, subspec. nov. ♂ genitalia. For legend see Fig. 1.

Distribution (Fig. 20). Western subspecies known thus far from the eastern and southern border of Kimberley Division, northern Western Australia and adjacent northwestern Northern Territory.

Habits. Lives in wet sand near rivers and creeks like other species of this genus. Commonly collected at light and in Barber traps exposed in wet sand close to pools in large river beds.

New records: 6♂♂, 8♀♀, WA95/24, Durack R., 87 km w. Pentecost R., 11.-12.8.1995, M. Baehr (CBM, ZSM, MNTD); 6♂♂, 2♀♀, NT95/42, West Baines River, 23.-24.8.1995, M. Baehr (CBM); 2♂♂, NT95/44, Victoria River, 5 km w. Victoria R. Cr., 24.-25.8.1995, M. Baehr (CBM); 4♂♂, 5♀♀, W.A. Upper Panton River, 30 April 1994, S. A. Hogenhout, River bank, at light (CBM, Coll. Hogenhout).

Porocara punctata arnhemensis, subspec. nov.

Figs 3, 6, 16, 20

Types. Holotype: ♂, 12.52S 132.47E Nourlangie Creek, 8 km E of Mt. Cahill, N. T. 7.X.1975 A. Allwood & T. Angeles, 12673 (MNTD).

Diagnosis. Distinguished from the other subspecies of *P. punctata* by moderately elongate elytra (Fig. 16), not divergent basal angles of pronotum (Fig. 6), and aedeagus with markedly concave lower surface and moderately elongate apex (Fig. 3).

Description

Measurements. Length: 8.15 mm, width: 3.1 mm. Ratio length/width of elytra: 1.64.

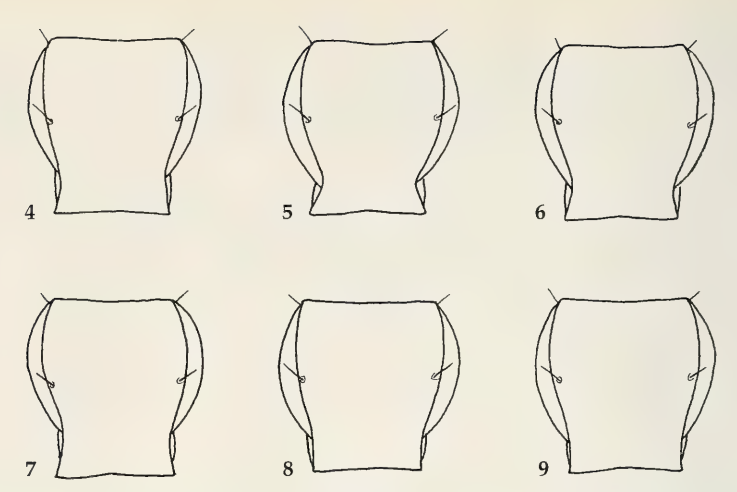
Colour. Light reddish, elytral pattern blackish, rather indistinct, forehead, mouth parts, legs, and basal antennomeres yellowish. Lower surface yellowish to red, only prosternum and mesosternum blackish.

Head. Of average size, puncturation of basal part moderately dense, otherwise similar to other subspecies.

Prothorax (Fig. 6). Rather convex, about as long as wide, puncturation fairly dense, rather regular, punctures mostly smaller than distance between them. Lateral margins near basal angles concave, though basal angles not markedly divergent.

Elytra (Fig. 16). Rather elongate, lateral border slightly convex. Microreticulation conspicuous, consisting of transverse meshes. Elytral pattern little contrasting, basal spot large, attaining base, postmedian vitta large, barely serrate. Otherwise similar to other subspecies.

♂ genitalia (Fig. 3). Genital ring comparatively wide, laterally convex, slightly asymmetric. Aedeagus small, <1.8 mm long, markedly curved, lower surface regularly concave, apex moderately elongate, considerably thickened, barely turned to right side, orificium with a fold at apex. Right paramere rather elongate.



Figs 4-9. Outline of prothorax. 4. *Porocara punctata punctata* Sloane. 5. *P. punctata kimberleyana* Baehr. 6. *P. punctata arnhemensis*, subspec. nov. 7. *P. nigricollis* Baehr. 8. *P. ulrichi*, spec. nov. 9. *P. occidentalis* Baehr.

♀ genitalia. Unknown.

Variation. Unknown.

Distribution (Fig. 20). Western escarpment of Arnhem Land, far Northern Territory. Known only from type locality.

Habits. Lives probably in wet sand near rivers and creeks like other species of this genus. Sympatric and at the type locality probably even syntopic with *P. nigricollis* Baehr.

Etymology. The name refers to the range of the subspecies.

Porocara nigricollis Baehr

Figs 7, 10, 17, 21

Baehr 1986, p. 722.

Diagnosis. Distinguished by black colour of pronotum, basal part of head, and proepisternum, short and remarkably parallel elytra (Fig. 17), and small, rather straight aedeagus with fairly elongate apex (Fig. 10).

Additional distinguishing character states

Ratio length / width of elytra: 1.56-1.62.

♂ genitalia (Fig. 10). Genital ring comparatively wide, laterally convex, symmetric. Aedeagus small, <1.8 mm long, gently curved, lower surface almost straight, apex fairly elongate, slightly thickened and hooked, gently turned to right side, orificium with a fold at apex. Right paramere rather elongate.

Distribution (Fig. 21). Far Northern Territory south to about Katherine.

Habits. Lives probably in wet sand near rivers and creeks like other species of this genus. Most specimens collected at light. Sympatric and probably even syntopic with *P. punctata arnhemensis*, subspec. nov.

New records: 2♂♂, 3♀♀, 12.52S 132.47E Nourlangie Creek, 8 km E of Mt. Cahill, N. T. 7.X.1975 A. Allwood & T. Angeles, 12673 (CBM, MNTD); 1♂, 12.52S 132.46E Nourlangie Creek 6 km E. of Mt. Cahill, N. T. 12.X.1972 T. Weir (MNTD); 1♂, 12.17S 133.20E Cooper Creek 11 km S by W of Nimbuwah Rock, N. T. 1.XI.1972 T. Weir & T. Angeles (MNTD); 1♂, 1♀, NT Kakadu N. P. Magela Creek OSS Site/009 Mv 12°42'S 132°57'E 8 July 1991 Wells & Webber (MNTD).



Fig. 10. *Porocara nigricollis* Baehr. ♂ genitalia. For legend see Fig. 1.

Porocara ulrichi, spec. nov.

Figs 8, 11, 12, 18, 21

Types. Holotype: ♂, NT95/42, West Baines River, 23.-24.8.1995, M. Baehr (MNTD). - Paratypes: 15♂♂, 15♀♀, same data, (ANIC, CBM, ZSM); 1♀, West Baines River, 9.-10.8.1995, M. Baehr (CBM); 1♀, NT95/44, Victoria River, 5 km w. Victoria R. Cr., 24.-25.8.1995, M. Baehr (CBM); 1♂, WA95/30, Fitzroy Crossing, 18.-19.8.1995, M. Baehr (CBM).

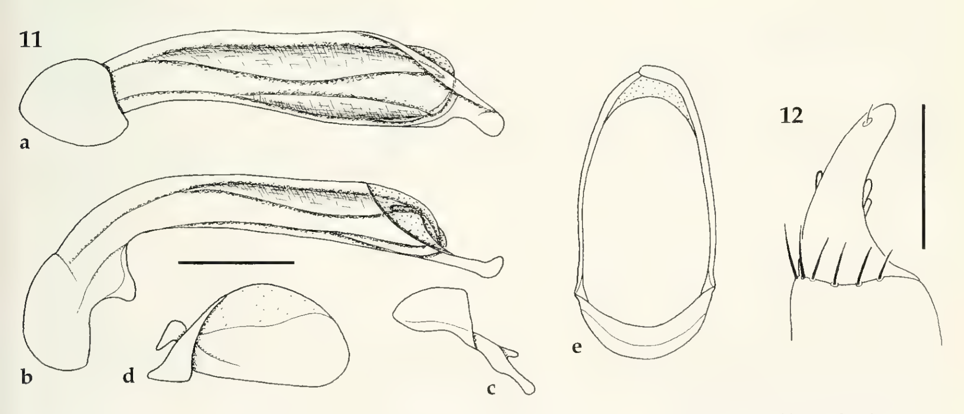
Diagnosis. Distinguished by elongate, laterally evenly convex elytra (Fig. 18), rather regular punctuation of head and pronotum, and large, at apex markedly upturned aedeagus that is barely striolate at lower surface (Fig. 11).

Description

Measurements. Length: 8.4-9.4 mm; width: 3.2-3.45 mm. Ratio length/width of elytra: 1.64-1.68

Colour. Light reddish, elytral pattern black, fairly distinct, forehead, mouth parts, legs, and basal antennomeres yellowish. Lower surface yellowish to red, only base of abdomen blackish.

Head. Of average size, puncturation of basal part moderately dense, otherwise similar to other species.



Figs 11-12. *Porocara ulrichi*, spec. nov. 11. ♂ genitalia. For legend see Fig. 1. 12. ♀ stylomere 2 and base of stylomere 1. Scale: 0.2 mm.

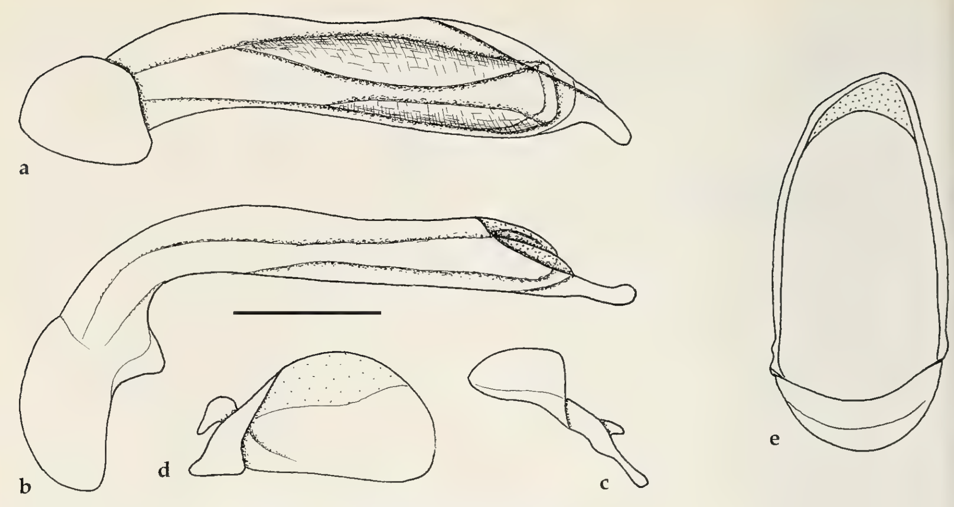


Fig. 13. *Porocara occidentalis* Baehr. ♂ genitalia. For legend see Fig. 1.

Prothorax (Fig. 8). Rather convex, slightly longer than wide, lateral border moderately convex, near basal angles concave, though basal angles not markedly divergent. Puncturation fairly dense, rather regular, punctures mostly smaller than distance between them.

Elytra (Fig. 18). Elongate, lateral border evenly convex. Microreticulation conspicuous, consisting of transverse meshes. Elytral pattern rather contrasting, basal spot large, not attaining base, postmedian vitta large, barely serrate. Otherwise similar to other species.

♂ genitalia (Fig. 11). Genital ring comparatively narrow, laterally barely convex, almost symmetric. Aedeagus large, >2.2 mm long, curved only in basal part, lower surface straight, barely striolate, apex elongate, markedly upturned at tip, rather abruptly turned to right side, orificium with a fold at apex. Right paramere rather short.

♀ genitalia (Fig. 12). Stylomere 1 large, at apex with 5-6 elongate setae. Stylomere 2 elongate, little curved, apex obtuse, with 2 short ventral ensiform setae, one short dorsal ensiform seta, both arising in middle, and one short nematiform seta situated near apex and originating from a pit.

Variation. Little variation noted, only variation of size rather important.

Distribution (Fig. 21). Northwestern part of far Northern Territory, adjacent northern Western Austrlia, from Victoria River west to Fitzroy River.

Habits. Lives in wet sand near rivers and creeks like other species of this genus. Mainly collected at light and in Barber traps exposed in wet sand close to pools in larger river beds, also found under pebbles imbedded in sand. When disturbed or at light, they are extremely agile, fast running beetles. In the eastern part of the range of *P. punctata kimberleyana* Baehr sympatric and even syntopic with this subspecies.

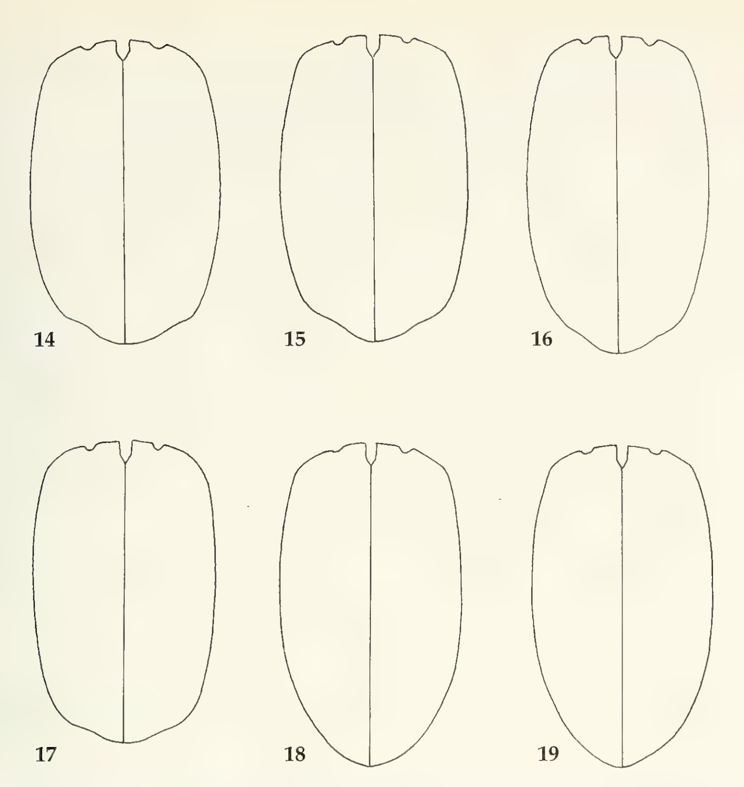
Etymology. Named in honour of my little son who enthusiastically helped collecting these fast running beetles.

Porocara occidentalis Baehr

Figs 9, 13, 19, 21

Baehr 1986, p. 723.

Diagnosis. Distinguished by elongate, laterally evenly convex elytra (Fig. 19), rather sparse, irregular puncturation of head and pronotum, and large, at apex markedly upturned aedeagus that is conspicuously striolate at lower surface (Fig. 13).



Figs 14-19. Outline of elytra. 14. *Porocara punctata punctata* Sloane. 15. *P. punctata kimberleyana* Baehr. 16. *P. punctata arnhemensis*, subspec. nov. 17. *P. nigricollis* Baehr. 18. *P. ulrichi*, spec. nov. 19. *P. occidentalis* Baehr.

Additional distinguishing character states

Ratio length/width of elytra: 1.62-1.67.

♂ genitalia (Fig. 13). Genital ring comparatively narrow, laterally barely convex, slightly asymmetric. Aedeagus large, >2.2 mm long, markedly curved in basal part, lower surface straight, conspicuously striolate, apex elongate, rather upturned at tip, abruptly turned to right side, orificium with a fold at apex. Right paramere rather short.

Distribution (Fig. 21). Northwestern Australia south of Great Sandy desert to Carnarvon in the south.

Habits. Lives in wet sand near rivers and creeks like other species of this genus. Mainly collected in Barber traps exposed in wet sand close to pools in large river beds.

New records: 10♂♂, 6♀♀, WA 18, Ashburton River b. Nanutarra, 3.-4.11.1987, M. Baehr (CBM).

Porocara glabrata Baehr

Baehr 1986, p. 724.

Diagnosis. Easily distinguished by absence of puncturation on head and pronotum, weak microreticulation on elytra, narrow, markedly serrate postmedian elytral vitta, and simple apex of aedeagus.



Fig. 20. Distribution of *Porocara punctata punctata* Sloane: ●, *P. punctata arnhemensis*, subspec. nov.: ♦, and *P. punctata kimberleyana* Baehr: ■.

Additional distinguishing character states

Ratio length / width of elytra: 1.56-1.60.

Aedeagus. Rather short and compact, lower surface almost straight. Apex short, not at all thickened or upturned.

Distribution. Southeastern margin of Kimberley Division, northwestern Australia.

Habits. Lives in wet sand near rivers and creeks like other species of this genus. Commonly collected at light.

New records: No new material recorded.

Tab. 1. Comparison of size and of length/width ratio of elytra in the taxa of *Porocara*.

	length(mm)	l/w ratio
P. p. punctata Sloane	8.6-9.4	1.55-1.58
P. p. arnhemensis, subspec. nov.	8.15	1.64
P. p. kimberleyana Baehr	8.1-9.3	1.62-1.64
P. nigricollis Baehr	8.1-8.7	1.56-1.62
P. ulrichi, spec. nov.	8.5-9.5	1.64-1.68
P. occidentalis Baehr	9.4-9.8	1.62-1.67
P. glabrata Baehr	8.8-9.6	1.56-1.60



Fig. 21. Distribution of *Porocara nigricollis* Baehr: ●; *P. ulrichi*, spec. nov.: ■, and *P. occidentalis* Baehr: ♦.

Discussion

Origin of the genus *Porocara*

As explained in my previous revision (Baehr 1986), *Porocara* is perhaps an old Australian faunal element, and altogether, it is perhaps the most primitive odacanthine genus at all that exhibits few of the special "odacanthine" morphological features. The primitive status of *Porocara*, both in morphology and way of life, but also the possible origin of the genus in Australia, has been recently supported by examination of *Grundmannius dispar* (Péringuey), an "aberrant" South African beetle belonging to the subfamily Chlaeniinae. *Grundmannius*, though characterized as a chlaeniine by some of its technical characters, has exactly the same bulky and convex body shape, relatively short and wide, though convex elytra, elongate mandibles, very elongate legs, and light reddish colour with blackish basal and postmedian transverse fasciae on the elytra, as *Porocara*. The single examined specimen has been likewise obtained in sand of a river bed, and hence, it probably has the same way of life as *Porocara*. Although *Grundmannius* is slightly larger than *Porocara* and occurs in subtropical southern Africa (northern Natal), it exhibits exactly the same life style type. Like *Porocara*, *Grundmannius* does not show the usual body shape, colour, and way of life of its subfamily. Therefore, I think that occurrence in pure wet sand of river beds, nocturnal habits, light reddish colour, convex body shape, very elongate legs, and large eyes represent the original state in both, primitive Odacanthinae and Chlaeniinae. If this hypothesis is true, then both subfamilies would still have their most plesiotypic members in the southern continents, and this would support the idea of the Gondwanan origin of Odacanthinae (as well as of Chlaeniinae).

This idea is further supported by the occurrence of several other rather primitive odacanthine genera in Australia and New Guinea, some of which, at least, occur in sandy river beds. Generally, however, they are found under stones and between low vegetation, rather than in pure sand.

This scenario would also confirm Erwin's (1985) hypothesis of "taxon pulse's" in many carabid groups.

Erwin's idea was that the original stocks of most carabid groups lived in wetlands or near water in tropical lowlands, from where they spread to other biotas and to the highlands. In Odacanthinae, for example, this would mean an ecological shift to life on the forest floor of tropical rain forest (e.g. in certain New Guinean and north Australian species) and another shift to life on vegetation (in many of the "higher" odacanthine genera throughout the world).

To conclude, there is some reason to believe that *Porocara* belongs to the so-called "Old Gondwanan faunal element" (Mackerras 1970, Howden 1981, Baehr 1991) in Australia that is part of a very old fauna, remnants of which still exist in subtropical-tropical parts of Africa and South America, and in Australia.

Hence, probably *Porocara* is an old indigenous faunal element of Australia that was primarily adapted to warm temperate to subtropical conditions, but was subsequently adapted to tropical climatic conditions when the Australian plate during Tertiary drifted in northerly direction.

Distribution and zoogeography of the species

Although all species of *Porocara* are extremely similar in body shape, colour pattern, and structure of surface (the last except for *P. glabrata* Baehr), they clearly divide in three groups according to size and structure of aedeagus. The most outstanding group, represented by *P. glabrata* only, has a small, straight aedeagus with simple apex. This group is further characterized by the loss of the puncturation on the upper surface of head and pronotum. The second group (*P. punctata* and its subspecies, and *P. nigricollis*) has small, more or less curved aedeagi with thickened but less upturned apex. The third group (*P. ulrichi, P. occidentalis*) has large, straight aedeagi with distinctly upturned apex. Therefore, three separate stocks of *Porocara* exist in Australia that all broadly coexist in vast parts of tropical northern Australia, moreover, that are syntopic in several localities, and have been found even in the same barber trap (see tab. 2).

In all species body shape and pattern, length of mandibles, length of legs, size of eyes, and the habits of hiding in wet sand during daytime and foraging at night around pools, are extremely similar. That means that the life style type ("Lebensformtyp" sensu Koepcke) of all taxa is also similar. This would raise the question, how it is possible that two or even three closely related taxa with exactly the same way of life can coexist in the same place.

Some ideas about the phylogenetic relations within the genus were presented in the previous revision (Baehr 1986) and are not repeated here, but are used for the subsequent discussion.

With regard to distribution, occurrence of two species in far Northern Territory and of four species in northwestern Australia is most essential, especially, as three of the latter have almost exactly the same ranges and even coexist in some places. In north Queensland, on the other hand, only a single species exists.

This distribution pattern is another conspicuous evidence of the importance of refugia in northern and northwestern Australia. Although humid Queensland should offer better and more diverse conditions for ripicolous beetles than the partly semiarid Kimberley and Hamersley areas, obviously these suitable conditions have not been favoured the evolution of additional species in North Queensland, whereas under the less suitable climatic conditions in northern and northwestern Australia such evolution occurred. This can be only explained by repeated colonizations of Arnhem Land and the Kimberleys by different stocks of *Porocara*, that were subsequently isolated, and thus evolved to separate species in the refugias, whereas in Queensland comparable isolations of populations did not occur.

The first stock to invade the Kimberleys and to become isolated there was that from which present *P. glabrata* is derived, the species that is now phylogenetically most isolated.

The second stock has split in the present *P. ulrichi* and *P. occidentalis* that at present are distributed in the Kimberleys and in the Hamersley area, i.e. to the north and to the south of the Great Sandy Desert,

Tab. 2. Records of syntopic occurrence of different species of *Porocara*.

P. punctata arnhemensis, subspec. nov. - *P. nigricollis* Baehr:	Nourlangie Creek, Arnhem Land, Northern Territory.
P. punctata kimberleyana Baehr - *P. ulrichi*, spec. nov.:	Victoria River, 5 km w. of Victoria River Crossing; West Baines River at highway crossing; both localities in northwestern Northern Territory.
P. punctata kimberleyana Baehr - *P. ulrichi*, spec. nov. - *P. glabrata* Baehr:	Fitzroy Crossing, northern Western Australia.

respectively. In northwestern Australia the Great Sandy Desert extends as a several hundred kilometers wide corridor right to the coast and at present acts as a major barrier for the fauna. This applies in particular for ripicolous beetles, because between Fitzroy River at the southern margin of the Kimberleys, and De Grey River north of the Hamersley area no rivers or creeks exist.

Diversification of the third stock occurred more recently, but presumably in two events: first the stock of present *P. nigricollis* invaded into or was isolated in far northern Territory, later the present species *P. punctata* either extended over whole northern tropical Australia and afterwards evolved into separate subspecies; or, in the case this species originally ranged over the whole area it inhabits at present, three populations were isolated and evolved into the present subspecies.

Because phylogenetic evidence shows that in both, the *punctata-* and *ulrichi-*stocks the western taxa are most apotypic in certain character states, it can be argued that range spreading generally proceeded in an easterly to westerly direction, and/or that in the western populations evolution was enforced. So, altogether four speciation events occurred at different times, resulting in a threefold colonization of the Kimberley area, and a double colonization of Arnhem Land.

Due to the close relationships of most taxa (apart from *P. glabrata*) dating of the speciation events is difficult. It is possible that the most recent speciation, namely evolution of the subspecies of *P. punctata*, was even a postglacial event, because slow drying out of the faunal barriers south of the Gulf of Carpentaria and in northwestern Northern Territory would have supported isolation. Certainly, this event did not occur before last interglacial, but most probably during one of the more recent interstadials of the last glaciation period. Presumably *P. nigricollis* did not evolve much earlier according to the still close relationship with *P. punctata*. Separation of the *ulrichi-*stock and subsequent separation into present *P. ulrichi* and *P. occidentalis* probably occurred not later than during last interglacial, whereas the origin of the *glabrata-*stock probably was an event prior to last interglacial.

As a conclusion it can be stated that in *Porocara*, although the genus represents an old Australian faunal element, speciation occurred but recently and perhaps exclusively during (late) ice-age. *Porocara* shares this pattern of biogeographical history with several other carabid (and non-carabid) groups occurring throughout northern tropical Australia.

The recent discovery of two new taxa is evidence that still additional new taxa may be detected in future. Then, some aspects of relationships and biogeographical history of the genus may change again.

Acknowledgements

For the kind loan of specimens I am indebted to Miss S. Hogenhout (Leiden) and Dr. G. Brown (Darwin). A large part of the recorded material was collected during a travel that was supported by a travel grant of the Deutsche Forschungsgemeinschaft (DFG). Here I want to thank once more the authorities of the DFG. I also thank my little son Ulrich who enthusiatically helped collect these extremely agile beetles.

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26. Grenard, S.: Alligators and Crocodiles. - Krieger Publo. Comp., Malabar, Florida, 1991. 210 S., zahlr. Abb. und Karten, 15 Farbtafeln. ISBN 0-89464-435-1.

Eine Monographie der Alligatoren und Krokodile, die alle 8 Gattungen und 23 Arten dieser Reptilienordnung behandelt. Sie wird heute in der einzigen rezenten Familie der Crocodylidae mit 4 Unterfamilien (Alligatorinae, Crocodylinae, Tomistominae, Gavialinae) zusammengefaßt. Das Werk beginnt mit einem Abschnitt zu Gefährdung und Schutz, dann folgt eine ausführliche Darstellung der Anatomie und der biologischen Funktionen. Die zahlreichen Zeichnungen von Wanda Loutsenhizer bilden hierbei eine besonders informative Ergänzung. Im Hauptteil des Buches werden schließlich die einzelnen Arten nacheinander abgehandelt. Jeder Art ist eine Kurzcharakteristik in Stichworten mit wissenschaftlichem Namen, Status, Verbreitung, Habitat und Nahrung vorangestellt. Die danach folgenden Bemerkungen enthalten wiederum viele biologische, ethologische, historische und die Gefährdung betreffende Informationen. Besonders ausführlich gerieten die Abschnitte über den Mississippi-Alligator und das Spitzkrokodil, wohl verständlich, da es sich mit Steve Grenard um einen Autor aus den USA handelt. Man vermißt indessen, bei der Fülle der interessanten Details, einen Bestimmungsschlüssel. Außerdem wurden die Verbreitungsgebiete der einzelnen Arten in den Karten sehr oberflächlich dargestellt, und für das Nilkrokodil sind sie schlicht falsch. Das Literaturverzeichnis ist ausführlich. Im Anhang findet sich eine brauchbare Liste von gezeichneten Ansichten der Kopf- und Nackenregion zur Arten-Identifikation. Der Band kann als eine schöne Ergänzung und Erweiterung des Krokodilkapitels im alten Wermuth-Mertens'schen Werk über "Schildkröten, Krokdile und Brükkenechsen" angesehen werden.

U. Gruber

27. Vitt, L. J. & E. R. Pianka (ed.): Lizard Ecology, Historical and Experimental Perspectives. - Princeton University Press, Princeton, New Jersey, 1994. 403 S., 83 Abb., 34 Tab. ISBN 0-691-03649-7.

L. J. Vitt und E. R. Pianka haben in diesem Symposiumsband 24 Autoren dazu gewonnen, in insgesamt 14 Beiträgen eine Echsen-Ökologie zu erstellen, die sich allerdings vorwiegend mit den Echsen der Neuen Welt beschäftigt. Europäische Eidechsen z. B. werden nur wenig berücksichtigt. Der Stoff ist in 4 Kapitel unterteilt: Fortpflanzungsökologie, Verhaltensökologie, Evolutions-Ökologie und Populations-Ökologie. Die Beiträge innerhalb dieser Kapitel sind sehr spezialisiert, befassen sich beispielsweise mit Fortpflanzungsbilanzen, der Gelegeumgebung während der Inkubation der Eier, dem Aufspüren von Beute, phyllogenetischen Perspektiven der Evolution, Phänomenen der Populationsdynamik, Mustern des Ausbreitungs-Verhaltens, phyllogenetischen Analysen der Ausdauerkapazität in Abhängigkeit von Körpergröße und Körpertemperatur, Populations-Fluktuationen bei tropischen Echsen oder der historischen Determination von Gemeinschaftsstrukturen bei Echsen. Eine Vielzahl von Grafiken und Tabellen konkretisiert die Aussagen der Texte. Das Literaturverzeichnis ist am Schluß des Bandes für alle Beiträge zusammengefaßt. Ergänzend gibt es schließlich einen Autoren- und einen Artenindex.

U. Gruber

28. Culotta, W. A. & G. V. Pickwell: The Venomous Sea Snakes, a Comprehensive Bibliography. - Krieger Publ. Comp., Malabar, Florida, 1993. 504 S.

Diese Bibliographie der zu den Giftnattern gehörenden Seeschlangen (Unterfamilie Hydrophiinae) beginnt mit einer Liste der zitierten Zeitschriften. Sodann folgt die Literatur vor dem 19. Jahrhundert. Danach kommt die Hauptmasse der Zitate, sorgfältig augeschlüsselt in 23 Unterabschnitte. Darunter finden sich so wichtige Kapitel wie Taxonomie und Systematik, Verbreitung, Evolution und Genetik, Ökologie, Ernährung, Feinde, Parasiten, Fortpflanzung, Anatomie und Morphologie, Physiologie, mehrere Abschnitte über die Gifte (Biochemie, Toxizität, Morphologie der Giftdrüsen oder Gift-Biochemie), Seeschlangen in Gefangenschaft und Nutzung von Seeschlangen durch den Menschen. An jedes Einzelkapitel ist ein Gattungs-Arten-Index angeschlossen. Den Schluß des umfangreichen Werkes bildet ein Autoren-Index. Für Fachleute, die sich mit Seeschlangen beschäftigen, ist dies eine wahre Literatur-Fundgrube.

U. Gruber

SPIXIANA	19	3	267-270	München, 01. November 1996	ISSN 0341-8391

Neue *Zorochrus*-Arten aus der Sammlung G. Frey

(Insecta, Coleoptera, Elateridae, Negastriinae)

Von **W. G. Dolin**

Dolin, W. G. (1996): Neue *Zorochrus*-Arten aus der Sammlung G. Frey (Insecta, Coleopera, Elateridae, Negastriinae). – Spixiana **19/3:** 267-270

Three new species of the genus *Zorochrus* Thoms. collected by Dr. G. Frey in Iraq and Syria are described.

Prof. Dr. W. G. Dolin, Institute für Zoologie, B.-Chmelnizkoho-Str. 15, 252030 Kiew -30, Ukraine.

Beim Studium der Elateriden der Sammlung Frey habe ich einige unbeschriebene Schnellkäfer-Arten entdeckt, darunter drei neue *Zorochrus*-Arten aus der Unterfamilie Negastriinae, deren Beschreibung hier folgt. Die Typen der neuen Arten sind in der Sammlung Frey aufbewahrt.

Zorochrus freyi, spec. nov

Abb. 1-3

Holotypus: ♀, Irak, Kanakin, 09.04.1936, Frey, mit dem originalen Bestimmungsetikett von Dr. G. Binaghi "*Hypnoidus araxicola* Reitt.".

Diagnose: Die neue Art unterscheidet sich von ähnlich gefärbten Arten durch die Form des Halsschildes und der Flügeldecken sowie den breiten, gelb-braunen Schulterflecken, die fast ein vollständiges Querband bilden.

Beschreibung

Maße: Länge 3.1 mm, Breite 1.9 mm.

♀: Färbung schwarz, Fühler, Beine und 4 Flecken auf den Flügeldecken (im vorderen Drittel fast ein queres Band bildend) gelb-braun. Ober- und Unterseite dicht kurz weißgrau behaart (Abb. 1).

Kopf abgeplattet, ziemlich grob granuliert und sehr fein punktiert, Vorderrand der Stirn sehr breit gerundet und fein gerandet. Fühler schlank, kurz, um die Länge der zwei vorletzten Glieder die Spitzen der Hinterwinkel des Halsschildes nicht erreichend; 2. und 3. Glied zylindrisch, 2. Glied 2.3 × so lang wie breit und 1.15 × länger als das 2., letztes Glied 2 × so lang wie breit; vom 4. Glied an die Fühler schwach sägeförmig; das 4. Glied gleich lang wie das 2. und 1.75 × länger als an der Spitze breit; 5. Glied und die übrigen gleich lang, 1.2 × kürzer als das 4. Glied (Abb. 2) und 1.3-1.35 × so lang als an der Spitze breit.

Halsschild schwach gewölbt, im hinteren Drittel am breitesten, kaum breiter als lang, fast gleichmäßig fein granuliert und sehr fein punktiert; vor den Hinterwinkeln verengt und konkav gebogen, so daß die Hinterwinkel schwach divergieren. Hinterwinkel kurz, schmal, einen Winkel von ca. 45° bildend, an der Spitze abgestumpft.

Schildchen flach, ein wenig breiter als lang, an der Basis gerade abgestutzt, an der Spitze abgerundet (Abb. 3).

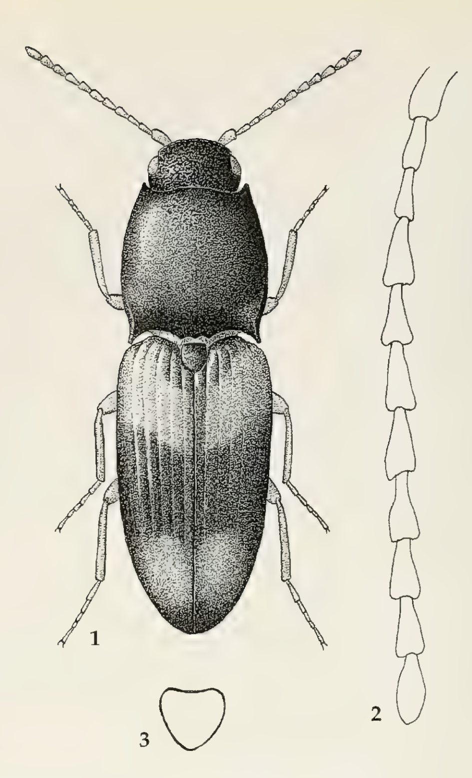


Abb. 1-3. *Zorochrus freyi*, spec. nov. 1. Totalansicht. 2. Fühler. 3. Schildchen.

Flügeldecken etwas schmäler und 2 × so lang wie der Halsschild, im vorderen Drittel breiter. Längsstreifen fein, seicht, ohne Punktur; Zwischenräume flach, fein quer gerunzelt und sehr fein punktiert. Die Hintertarsen so lang wie die Hinterschienen.

♂: Unbekannt.

Etymologie: Ihrem Entdecker, dem berühmten Koleopterologe Dr. Georg Frey gewidmet.

Zorochrus georgi, spec. nov.

Abb. 4, 5

Typen: Holotypus: ♀: Irak, Bagdad, 04/1936, G. Frey. - Paratypen: 2♀♀, mit den gleichen Daten.

Diagnose: Diese neue Art ist habituell dem *Z. angularis* sehr ähnlich, unterscheidet sich aber gut durch den scharfen Kiel auf den Hinterwinkeln des Halsschildes und durch die dichte gleichmäßige Granulierung des Halsschildes.

Beschreibung

Maße: Länge 2.8-3.5 mm, Breite 0.9-1.2 mm.

♀: Färbung schwarz, matt, erste 3 Fühlerglieder gebräunt, Beine gelblich-braun. Oberseite bronzegelb, Unterseite weißgrau, kurz anliegend behaart (Abb. 4, 5).

Kopf abgeflacht, granuliert-punktiert, Vorderrand der Stirne gleichmäßig breit gerundet und schmal gesäumt. Fühler kurz, die Spitzen der Hinterwinkel des Halschildes knapp erreichend; 2. und 3. Glied zylindrisch, 2. Glied merklich länger als das 3.; 2. Glied 2.4 ×, das 3. 2.2 × so lang wie breit; vom 4. Glied

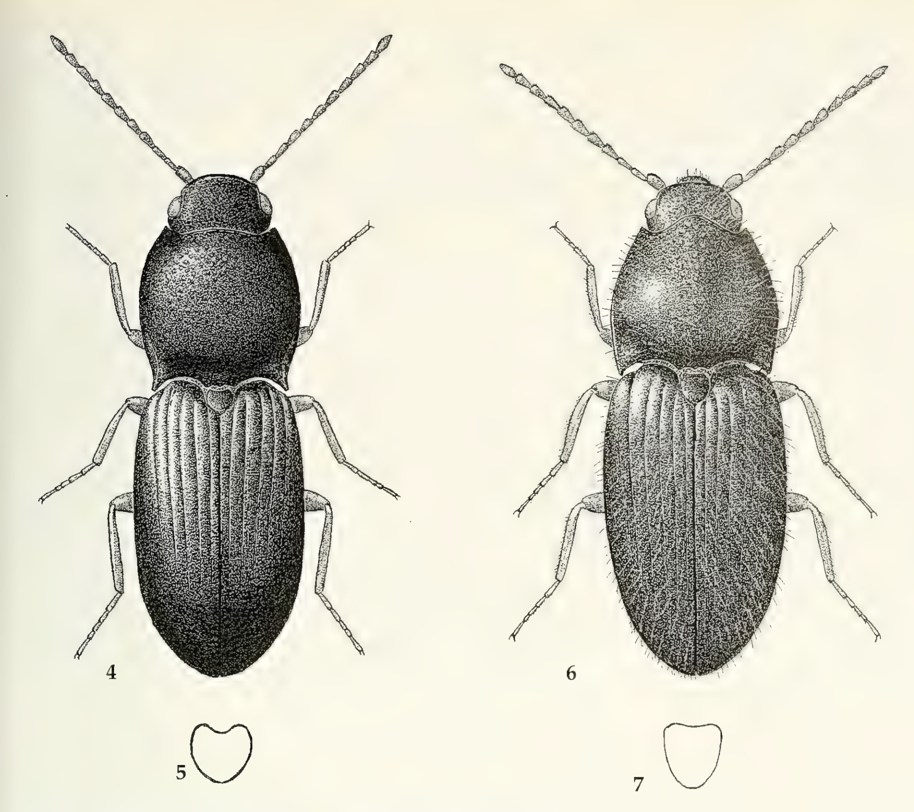


Abb. 4, 5. *Zorochrus georgi*, spec. nov. 4. Totalansicht. 5. Schildchen.
Abb. 6, 7. *Zorochrus persimilis*, spec. nov. 6. Totalansicht. 7. Schildchen.

an die Fühler schwach sägeförmig, zur Spitze allmählich verkürzt, 4. Glied 1.8×, das 10. Glied 1.5× so lang wie an der Spitze breit.

Halsschild ein wenig breiter als lang (1.1×), etwa in der Mitte am breitesten, Seitenränder gleichmäßig konvex, daher am Vorderrand nur 1.16× schmaler als an der Basis; mäßig gewölbt und vollständig granuliert, Körnchen vorne in der Mitte am größten. Hinterwinkel gekielt, gerade nach hinten gerichtet, der scharfe Kiel etwas länger als ein Drittel der Halsschildslänge. Kragen des Thorax fast gerade abgestutzt, wie die Scheibe vorn sehr stark granuliert, nicht nach unten gebogen.

Schildchen deutlich breiter als lang (1.2×), herzförmig, flach (Abb. 5). Flügeldecken langoval, flach, 2× so lang wie der Halsschild und 1.6× so lang wie in der Mitte breit, fein punktiert gestreift, die Punkte in den Streifen nicht breiter als die Streifen selbst. Zwischenräume flach, sehr fein granulös punktiert und quer gerunzelt. Schienen deutlich abgeplattet, Hintertarsen deutlich kürzer als Hinterschienen.

♂: Unbekannt.

Etymologie: Ihrem Entdecker, Dr. Georg Frey gewidmet.

Zorochrus persimilis, spec. nov.

Abb. 6, 7

Typen. Holotypus: ♀, Beirut, Syrien, 20.04.1936, G. Frey, mit dem originalen Bestimmungsetikett von G. Binaghi "*Zorochrus pilosellus* Reitt.".

Diagnose: Die neue Art gehört zur *Z. alysidotus*-Gruppe und unterscheidet sich deutlich von *Z. pilosellus* Rtt. durch die Form und Skulptur des Halsschildes und die deutlich längeren abstehenden Haare.

Beschreibung

Maße: Länge 4.6 mm, Breite 1.3 mm.

♀: Schwarz, stark glänzend, die Spitze des 1. Fühlergliedes und die Beine rötlich-braun, die 3.-11. Fühlerglieder schwarz-braun. Oberseite mit doppelter Behaarung: außer kurzen anliegenden Härchen noch mit langen senkrecht abstehenden Haaren (Abb. 6), die auf allen Segmenten gleich lang sind.

Kopf abgeflacht, grob granuliert, Vorderrand der Stirne breit gerundet und fein gesäumt. Fühler kurz, die Spitzen des Halsschildes knapp erreichend; 2. und 3. Glied zylindrisch, fast gleich lang, 2.3 × so lang wie breit; vom 4. Glied an die Fühler schwach sägeförmig erweitert, das 4. Glied 1.6 × so lang wie an der Spitze breit, übrige Glieder zur Spitze ein wenig kürzer.

Halsschild stark gewölbt, 1.15 × breiter als lang, im hinteren Drittel am breitesten, mit stark convexen Seitenrändern, die vor den ungekielten, fast rechteckigen Hinterwinkeln nicht ausgeschweift sind, so daß die letzteren merklich nach innen gerichtet sind. Vorderrand des Halsschildes in der Mittel stark vorragend, die Scheibe vorne in der Mitte sehr grob granuliert, die grobe Körnchen längs der Mittellinie bis zum hinteren Drittel reichend. Seitenteile des Halsschildes fast glatt und glänzend, fein punktiert.

Schildchen herzförmig, etwas länger als breit, an der Spitze gerundet (Abb. 7). Flügeldecken lang oval, doppelt so lang wie der Halsschild und 1.7 × so lang wie in der Mitte breit. Längsstreifen fein, undeutlich und weitläufig punktiert. Zwischenräume flach, sehr fein punktiert. Vorder- und Mittelschienen deutlich abgeflacht und merklich verbreitert.

♂: Unbekannt.

Danksagung

Für liebenswürdige Unterstützung bei meiner Arbeit möchte ich den Herren Dr. M. Baehr und M. Kühbandner von der Zoologischen Staatssammlung München, meinen herzlichen Dank aussprechen.

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Übersicht über die europäischen Arten von *Lethades* Davis

(Insecta Hymenoptera, Ichneumonidae, Ctenopelmatinae)

Von **Rolf Hinz (†)**

Herausgegeben von **Klaus Horstmann**

Hinz, R. (1996): Übersicht über die europäischen Arten von *Lethades* Davis (Insecta Hymenoptera, Ichneumonidae, Ctenopelmatinae). – Spixiana **19/3**: 271-279

The European species of *Lethades* Davis are revised. A key is provided for 12 species. The male is described for *Lethades cingulator* Hinz, and *L. curvispina* (Thomson), *L. facialis* (Brischke) and *L. scabriculus* (Thomson) are redescribed as separate species. A neotype is designated for *Trematopygus facialis* Brischke. Four species are described as new: *L. erichsonii*, *L. imperfecti*, *L. poloniae* and *L. schmiedeknechti*.

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Vorbemerkung des Herausgebers

Rolf Hinz hat stets lieber mit lebenden als mit toten Tieren gearbeitet, und das Zusammenschreiben von Publikationen hat er in der Regel so lange wie möglich hinausgeschoben. Deshalb enthält sein wissenschaftlicher Nachlaß eine große Zahl von Notizen und mehr oder weniger vollständig fertiggestellten Manuskripten. Ich habe vor, in den kommenden Jahren aus dem Nachlaß eine Reihe von Arbeiten zu publizieren und sie dabei entweder weitgehend unverändert zum Druck zu geben oder ergänzende Untersuchungen durchzuführen, um die vorliegenden Unterlagen zu vervollständigen. Ich trage damit gleichzeitig eine Dankesschuld an meinen Lehrer und Freund ab, ohne dessen vielfältige Hilfe ich mich nicht in die Taxonomie der Familie Ichneumonidae hätte einarbeiten können.

Von der vorliegenden Revision lagen Bestimmungsschlüssel für die Weibchen und Männchen und vollständig ausformulierte Beschreibungen der Arten *Lethades facialis* (Brischke), *erichsonii*, spec. nov., *poloniae*, spec. nov. und *schmiedeknechti*, spec. nov. vor. Über die mit *L. scabriculus* (Thomson) näher verwandten Arten hat Hinz keine vollständige Klarheit mehr gewinnen können und hat vermutlich deswegen die weitere Bearbeitung der Gattung zurückgestellt. Er hat nicht nur *L. curvispina* (Thomson), *imperfecti*, spec. nov. und *scabriculus* (Thomson) unterschieden, sondern in den Bestimmungsschlüsseln weitere einzelne Exemplare abgetrennt, ohne aber klarzustellen, ob er diese wirklich als eigene Arten anerkannt haben wollte, und ohne Namen zu geben und Typen festzulegen. Diese nur durch Einzelexemplare vertretenen möglichen weiteren Arten werden in der folgenden Bearbeitung nicht berücksichtigt. Dagegen wurden die Typen von *Tryphon alpinus* Zetterstedt, *T. flavifrons* Zetterstedt, *Trematopygus curvispina* Thomson und *T. scabriculus* Thomson aus Lund und determiniertes Material der Arten *L. facialis* (Brischke) und *imperfecti*, spec. nov. aus London noch einmal untersucht, um Unklarheiten in den vorliegenden Notizen beseitigen zu können. Auch die ausformulierte Beschreibung von *L. imperfecti*, spec. nov. und Angaben über die Variationsbreite von *L. curvispina* (Thomson) (nach Angaben in den Notizen und nach dem in der Sammlung vorliegenden Material) stammen von mir. Für ihre Hilfe bei diesen Untersuchungen danke ich Dr. R. Danielsson (Zoologiska Institution, Lund) und Mr. D. G. Notton (Natural History Museum, London).

Herkunft des Untersuchungsmaterials

Bauer:	Collection R. Bauer, Wendelstein/Nürnberg
Bruxelles:	Institut Royal des Sciences Naturelles Belgique
Delémont:	Commonwealth Institute of Biological Control
Hinz:	Collection R. Hinz, Zoologische Staatssammlung, München
London:	The Natural History Museum
Lund:	Zoologiska Institution
München:	Zoologische Staatssammlung
Sawoniewicz:	Collection J. Sawoniewicz, Katedra Ochrony Lasu i Ekologii, Warszawa
Schwarz:	Collection M. Schwarz, Zoologisches Institut, Salzburg
Stockholm:	Naturhistoriska Riksmuseet
St. Petersburg:	Zoological Institute, Russian Academy of Sciences
Townes:	Collection H. Townes, American Entomological Institute, Gainesville
Warszawa:	Instytut Zoologii, Akademia Nauk
Zwakhals:	Collection C. J. Zwakhals, Arkel/Niederlande

Bestimmungsschlüssel

1. Flügel ohne Areola .... 2.

– Flügel mit Areola, der zweite Intercubitalnerv in der Regel mit Fenster .... 3.

2. Stirn, Scheitel, Schläfen, Wangen, Pronotum lateral, Mesopleuren und Metapleuren fein gerunzelt, nicht oder nur stellenweise fein und ziemlich undeutlich punktiert. Präpectalleiste dorsolateral nicht bis zum Vorderrand der Mesopleuren reichend. Schenkel III und Schienen III ganz rot. Beim Weibchen Fühlergeißel ganz dunkel, Glieder im letzten Drittel breiter als lang .... *amauronemati* (Hinz, 1961)

– Stirn, Scheitel, Schläfen, Wangen, Pronotum lateral, Mesopleuren und Metapleuren deutlich und dicht bis sehr dicht punktiert, auf den Mesopleuren zusätzlich gerunzelt. Präpectalleiste dorsolateral bis zum Vorderrand der Mesopleuren reichend. Schenkel III und Schienen III jeweils am Ende verdunkelt. Beim Weibchen Fühlergeißel basal hellrot, alle Glieder länger als breit. Männchen unbekannt .... *schmiedeknechti*, spec. nov.

3. Hinterleibstergite schwarz, höchstens mit hellen Hinterrändern .... 4.

– Mittlere Tergite ganz rot oder rot mit schwarzen Flecken .... 7.

4. Klauen deutlich gekämmt, an den Hinterbeinen Kammzähne mehr als halb so lang wie der Endzahn. Propodeum ohne Längsleisten, nur die Area petiolaris kräftig umrandet. Scheitel, Schläfen, Wangen, Pronotum lateral, Mesopleuren und Metapleuren überwiegend dicht und kräftig punktiert auf glänzendem Grund. Männchen unbekannt .... *poloniae*, spec. nov.

– Klauen höchstens fein und kurz gekämmt. Propodeum zumindest mit Längsleisten. Punktierung auf Kopf und Brust meist schwächer (bei *erichsonii*, spec. nov. intermediär) .... 5.

5. Schläfen direkt hinter den Augen parallel oder schwach erweitert (von oben gesehen). Mesopleuren ventral deutlich und dicht punktiert auf glänzendem, überwiegend glattem Grund. Dorsalkiele des ersten Hinterleibssegments kräftig, bis fast zum Ende reichend .... *erichsonii*, spec. nov.

– Schläfen hinter den Augen von Beginn an verengt. Mesopleuren ventral teilweise weniger punktiert. Dorsalkiele des ersten Tergits schwach, höchstens bis 0.7 der Tergitlänge reichend .... 6.

6. Mesopleuren ventral fein und ziemlich dicht punktiert auf glänzendem, stellenweise glattem Grund. Costulae deutlich. Zweites und drittes Tergit sehr fein strukturiert, stark glänzend. Alle Tergite mit sehr schmalem gelben Endrand. Beim Weibchen Clypeus apical oder ganz hell, Unterseite des Schafts gelb. Beim Männchen Brust fast ganz dunkel .... *cingulator* Hinz, 1976

– Mesopleuren ventral deutlich gerunzelt und nur fein punktiert, ziemlich matt. Costulae undeutlich oder fehlend. Zweites und drittes Tergit fein und dicht punktiert und fein gerunzelt, beide mit mehr oder weniger breitem gelbroten Endrand (in der Regel 0.2-0.3 der Tergitlänge). Beim Weibchen Clypeus und Schaft schwarz. Beim Männchen Prothorax, Mesoscutum und Mesopleuren mit großen gelben Flecken .... *laricis* Hinz, 1976

7. Bohrerscheiden knapp zweimal so lang wie der Metatarsus III, um 0.8 der Länge des Metatarsus III über die Cerci hinausragend. Erstes Hinterleibstergit in der Regel rot. Schläfen deutlich fein gerunzelt, sehr fein punktiert. Vorletzte Geißelglieder etwa so lang wie breit. Männchen nicht sicher bekannt .... *lapponicus* (Holmgren, 1857)

– Bohrerscheiden höchstens so lang wie der Metatarsus III, nur wenig oder nicht über die Cerci hinausragend. Erstes Tergit überwiegend oder ganz schwarz .... 8.

8. Schläfen und Ventralhälfte der Mesopleuren deutlicher punktiert als gerunzelt, in der Regel dicht bis sehr dicht punktiert (Punktierung bei kleinen Exemplaren schwächer). Erstes Hinterleibstergit sehr dicht punktiert und gerunzelt, seine Dorsalkiele bis über die Mitte reichend (aber ihr Hinterende zuweilen zwischen den Punkten undeutlich). Vorletzte Geißelglieder deutlich länger als breit .... *facialis* (Brischke, 1878)

– Schläfen und Ventralhälfte der Mesopleuren deutlicher gerunzelt als punktiert, in der Regel nur sehr fein punktiert auf deutlich gerunzeltem Grund. Erstes Tergit in der Regel feiner strukturiert, mit kürzeren Dorsalkielen .... 9.

9. Bohrerscheiden 0.9-1.0 mal so lang wie der Metatarsus III, über die Hinterleibsspitze deutlich vorragend. Glieder im letzten Drittel der Geißel deutlich breiter als lang. Erstes Hinterleibstergit schwarz, das zweite bis vierte ganz rot. Männchen unbekannt .... *lapponator* Hinz, 1976

– Bohrerscheiden 0.6-0.8 mal so lang wie der Metatarsus III, nicht über die Hinterleibsspitze vorragend (variabel, in Abhängigkeit von der Präparation). Glieder im letzten Drittel der Geißel mindestens so lang wie breit .... 10.

10. Fühlergeißel mit 28-31 Gliedern, das dritte Glied beim Weibchen 2.3-2.8 mal, beim Männchen 2.2-2.4 mal so lang wie breit. Mesopleuren fein gerunzelt, stellenweise fein und zerstreut punktiert, aber kaum mit längeren Streifen oder Runzeln .... *imperfecti*, spec. nov.

– Geißel mit 23-28 Gliedern, das dritte Glied beim Weibchen 1.9-2.4 mal, beim Männchen 1.9-2.2 mal so lang wie breit. Mesopleuren neben der feinen Körnelung zentral und frontal deutlich punktiert und/oder mit längeren Streifen oder Runzeln, insbesondere zentral vor der Längsfurche .... 11.

11. Geißel mit 23 Gliedern. Mesoscutum fein gerunzelt und an den meisten Stellen fein und dicht punktiert, relativ matt. Erstes Hinterleibssegment so lang wie breit. Erstes bis drittes Tergit neben der feinen Runzelung deutlich fein und an den meisten Stellen dicht punktiert. Männchen unbekannt .... *scabriculus* (Thomson, 1883)

– Geißel mit 24-28 Gliedern. Mesoscutum stellenweise deutlich glänzend, in der Regel glänzender als die Stirn. Erstes Hinterleibssegment in der Regel 1,1-1,3 mal so lang wie breit. Erstes bis drittes Tergit neben der feinen Runzelung in der Regel nur undeutlich punktiert .... *curvispina* (Thomson, 1883)

Revisionen

Lethades cingulator Hinz, 1976 (♂)

Das Männchen entspricht morphologisch gut dem Weibchen. Fühlergeißel mit 23-25 Gliedern. Hinterleib schlanker, das zweite Tergit fast so lang wie breit.

Färbung. Schwarz. Gelb: Taster, Mandibeln ohne Zähne, Clypeus, Gesicht, Wangen, Unterseite der Fühlerbasis, Fleck am lateralen Vorderrand des Prothorax, Beine I, Spitzen der Hüften II, Trochanteren II, Spitzen der Schenkel II, schmale Spitzen der Hüften III, Tegulae und Flügelwurzeln. Rest der Beine bräunlich, die Unterseite der Schenkel III, die breiten Spitzen der Schienen III und die Tarsen III sind schwach verdunkelt. Hinterleib wie beim Weibchen gefärbt (nach 2♂♂ aus Co. Wicklow/Irland, Townes, und Lomna/Polen, Sawoniewicz).

Die Art ist weit verbreitet. Außer dem Holotypus aus Deutschland (Hinz) lag Material (6♀♀, 2♂♂) aus Irland (Townes), Schottland (London), Polen (Sawoniewicz), Österreich (Townes), Türkei (London) und Korea (Townes) vor.

Lethades curvispina (Thomson, 1883) (♀,♂)

Es handelt sich um eine verbreitete, häufige und recht variable Art, die sich von den verwandten Arten nur schwer unterscheiden läßt. Gegenüber früheren Bearbeitungen (zum Beispiel Hinz 1976, p. 104) werden hier *Lethades imperfecti*, spec. nov. und *scabriculus* (Thomson) als eigene Arten abgetrennt. Möglicherweise verbergen sich unter dem Material von *L. curvispina* noch weitere Arten.

Die Holotypen von *Tryphon alpinus* Zetterstedt und *T. flavifrons* Zetterstedt stimmen mit den hier zu *L. curvispina* gestellten Männchen gut überein, allerdings fehlen ihnen alle Geißelspitzen. Da Horstmann (1968, p. 307) beide Namen Zetterstedts als Nomina oblita bezeichnet hat, ist unklar, ob sie benutzt werden dürfen. Die Art wird deshalb hier unter dem Namen Thomsons geführt.

Variabilität ♀. Fühlergeißel mit 24-28 Gliedern, das dritte Geißelglied 1.9-2.4 mal, die vorletzten Glieder 1.0-1.2 mal so lang wie breit. Mesoscutum in der Regel sehr fein gerunzelt und fein punktiert, etwas glänzend (glänzender als die Stirn), aber gelegentlich auch deutlicher gerunzelt und matt. Mesopleuren außerhalb des Speculums fein gerunzelt und stellenweise deutlich punktiert, zumindest zentral, häufig auch frontal mit einigen längeren Streifen oder Runzeln. Erstes Hinterleibssegment 1.0-1.3 mal so lang wie breit. Vordere Tergite in der Regel fein gerunzelt und sehr fein punktiert, gelegentlich auch stärker punktiert. Clypeus in der Regel ganz schwarz, selten apical gelb gerandet. Erstes Tergit apical und das zweite bis dritte (oder vierte) ganz rot oder das zweite Tergit mit zwei schwarzen Basalflecken. Bei dem Lectotypus sind die längeren Tibiensporne III deutlich gekrümmt (daher der Name), aber bei anderen Exemplaren ist dies nicht so ausgeprägt der Fall.

Variabilität ♂. Fühlergeißel mit 25-27 Gliedern, das dritte Geißelglied 1.9-2.2 mal, die vorletzten Glieder 1.2-1.3 mal so lang wie breit. Gesicht ganz gelb oder zentral mehr oder weniger ausgedehnt verdunkelt, im Extrem nur die Gesichtsorbiten breit gelb. Hüften I und II ganz gelb oder basal mehr oder weniger ausgedehnt verdunkelt. Zweites bis viertes Tergit rot, das zweite basal häufig mit zwei schwarzen Flecken, seltener mit einer schwarzen Querbinde, das vierte selten schwarz.

Die Art ist in Nordeuropa und den Alpen verbreitet (nach 43♀♀, 8♂♂): Schottland (London), Nord- bis Südschweden (Hinz, Townes, London, Lund, Stockholm), nördliches Rußland (St. Petersburg), Polen (Sawoniewicz), Norddeutschland (Hinz, München), Niederlande (Zwakhals), Schweiz (London), Südtirol/Italien (R. Bauer). Ein Weibchen wurde aus *Amauronematus* sp. an *Salix pentandra* gezogen (St. Petersburg), ein anderes aus einer Nematine an *Betula* sp. (Hinz).

Zusätzlich liegt eine Serie von 10 Männchen aus Kamtschatka vor (Stockholm). Diese sind relativ dunkel gezeichnet (Gesicht außerhalb der Orbiten und Basis des zweiten Tergits schwarz), unterscheiden sich aber sonst nicht deutlich von *L. curvispina*. Weil zugehörige Weibchen nicht bekannt wurden, bleibt die Determination unsicher.

Zusätzlich liegt eine Serie (1♀, 11♂♂) aus Kamtschatka vor (Stockholm), die zu *L. curvispina* gestellt wird, obwohl die Fühlergliederzahl etwas geringer ist (Fühlergeißel beim Weibchen mit 25, beim Männchen mit 22-25 Gliedern).

Lethades facialis (Brischke, 1878) (♀, ♂)

Bisher galt allgemein die Auffassung von Roman (1909, p. 301) und Pfankuch (1923, p. 582), daß *Trematopygus facialis* Brischke zur *scabriculus*-Gruppe der Gattung *Lethades* gehöre und wahrscheinlich mit *curvispina* (Thomson) identisch sei. Unter *Lethades facialis* in Hinz (1976, p. 104) wurde allerdings überwiegend *L. imperfecti*, spec. nov. verstanden, eine Art, die zu dieser Zeit noch nicht abgetrennt worden war. Von Kerrich determiniertes Material in London zeigte jedoch, daß es eine weitere Art gibt, die bis dahin unrevidiert war, die aber sehr gut mit der Beschreibung Brischkes übereinstimmt. Zu dieser Art gehört auch das Material, das von Zinnert (1969, p. 195) unter dem Namen *Trematopygus facialis* Brischke angeführt worden ist. Die Sammlung Brischke mit den Typen von *T. facialis* wurde durch Kriegseinwirkungen zerstört, und, soweit bekannt, befindet sich kein Material der Art in anderen Sammlungen. Da ein Exemplar der Art aus Polen vorliegt, das also nahe dem locus typicus gefangen wurde, wird dieses zur endgültigen Festlegung der Art und zur Stabilisierung der Nomenklatur als Neotypus bestimmt. Die Festlegung entspricht den Forderungen nach 75 der Nomenklaturregeln.

Neotypus: ♀, "Warszawa, nad Wisla, 18.6.75 nieuzytki, leg. W. Jedrzyczkowski" (Warszawa).

Beschreibung des Neotypus (♀)

Länge der Vorderflügel: 5.2 mm.

Gesicht und Stirn dicht punktiert, die Zwischenräume mit Struktur, kaum glänzend. Scheitel und Schläfen ebenfalls punktiert, mit stärkerem Glanz. Fühlergeißel mit 28 Gliedern, die Glieder länger als breit, im Enddrittel einige etwa quadratisch. Brust dicht punktiert mit glänzenden Zwischenräumen. Propodeum mit kräftigen Leisten, die Costulae deutlich. Das erste Hinterleibstergit deutlich und dicht gerunzelt, kaum glänzend, wenig länger als hinten breit, die Dorsalkiele bis über die Mitte deutlich, auch die folgenden Tergite deutlich und dicht runzlig punktiert.

Färbung. Schwarz. Gelb: Taster, Mandibeln ohne die Zähne, Rand des Clypeus, Spitze des Schafts unterseits, Pedicellus unterseits, Tegulae, Flügelbasis und Flecke der Hüften und Trochanteren I. Braun: Unterseite der Fühlergeißel, Flecke der Wangen (undeutlich), Hinterecken des Pronotums, Seitenrand des Mesoscutums vor den Flügeln (undeutlich) und Flecke der Hüften II. Rot: Beine ohne die Hüften und Hinterleib von der Hinterhälfte des ersten Tergits an. Der Hinterleib ist vom fünften Tergit an verdunkelt, aber nicht schwarz. Stigma dunkelbraun mit heller Basis.

Bei anderen Weibchen schwankt die Länge der Vorderflügel zwischen 4.2 und 5.4 mm, die Zahl der Geißelglieder beträgt 25-28. Der Fleck am Seitenrand des Mesoscutums kann gelb sein oder auch fehlen.

Die zugehörigen Männchen entsprechen den Weibchen, mit folgenden Abweichungen: Alle Geißelglieder sind länger als breit. Clypeus, Gesicht, meist auch Wangen und die Unterseite der basalen Geißelglieder sind gelb. Auch die Hüften I und II sind stärker gelb gezeichnet. Bei einigen Männchen sind die Seiten des Mesoscutums breit gelb gerandet. Das Ende des Hinterleibs ist in der Regel stärker verdunkelt, das zweite Tergit trägt oft zwei dunkle Basalflecken, bei kleineren Tieren sind manchmal auch weitere Tergite dunkel gezeichnet.

Auffallend ist bei der Art die deutliche Punktierung des Körpers, vor allem des Kopfes, die besonders an den Schläfen hervortritt. Allerdings kann sie bei kleineren Tieren auch weniger stark ausgeprägt sein.

Beschrieben nach dem Neotypus aus Polen und weiterem Material (12♀♀, 13♂♂) aus: England (London), Norddeutschland (München), Polen (Sawoniewicz), Österreich (Delémont, London, Schwarz), Tschechien und Portugal (London). Ein Teil des Materials wurde aus folgenden Wirten (alles Tenthredinidae, Nematinae) gezogen: *Nematus capreae* (Linnaeus) (syn. *miliaris* Panzer) (Delémont), *N. ferrugineus* Förster, *N. pavidus* Lepeletier, *N. salicis* (Linnaeus) und *Croesus septentrionalis* (Linnaeus) (London). Zinnert (1969, p. 195) zog die Art zusätzlich aus *N. melanaspis* Hartig.

Lethades scabriculus (Thomson, 1883) (♀)

Diese Art ist von Horstmann (1968, p. 318-319) und Townes (1970, p. 70) mit *Tryphon alpinus* Zetterstedt und *T. flavifrons* Zetterstedt und von Aubert (1984, p. 56) mit *Trematopygus curvispina* Thomson synonymisiert worden. Der Lectotypus (Townes et al. 1965, p. 242) weicht allerdings von *Lethades curvispina* (Thomson) durch folgende Merkmale ab: Fühlergeißel nur mit 23 Gliedern, das dritte Geißelglied 2.2 mal, die vorletzten 1.2 mal so lang wie breit (in den Proportionen kein Unterschied zu *curvispina*). Mesoscutum fein gerunzelt und an den meisten Stellen fein und dicht punktiert, überwiegend matt, nicht glänzender als der Dorsalbereich des Kopfes. Erstes Hinterleibssegment so lang wie breit. Die vorderen Hinterleibstergite neben einer feinen Runzelung deutlich und dicht runzlig punktiert, matt.

In jedem dieser Merkmale finden sich Übergänge zu jeweils anderen Exemplaren von *L. curvispina*, allerdings wurde bisher kein zweites Weibchen mit so niedriger Geißelgliederzahl bekannt. Es könnte sich bei dem Lectotypus von *L. scabriculus* um eine Extremvariante von *curvispina* oder um den Vertreter einer weiteren Art handeln. Aus Vorsicht werden hier zwei getrennte Arten geführt. Die Typen der beiden von Zetterstedt beschriebenen Arten passen besser zu *curvispina* (vgl. dort).

Neubeschreibungen

Lethades erichsonii, spec. nov. (♀, ♂)

Typen. Holotypus: ♂, "Austria 159 Styria 14.5.67", "*Pristiphora erichsonii* Htg. (Tenthr.)", "Pres by Com Inst Ent B M 1973-1" (London). - Paratypus: ♀, "Murtal, XI, 50," (Steiermark/Österreich), "ex: *Pristiphora erichsonii* Htg. (Tenthr.)", "C.I.E.Coll. No. 16872", "Pres by Com Inst. Ent. B M 1960-3" (London).

Zum Holotypus wird das Männchen bestimmt, weil bei dem Weibchen die Flügel verkrüppelt sind. Die anderen Körperteile sind noch zur Beschreibung geeignet. Die Art wurde von Zinnert (1969, p. 195) als "*Trematopygus* sp. A" geführt.

Beschreibung

Länge der Vorderflügel. 5.2 mm.

Kopf. Clypeus wenig vom Gesicht getrennt, zerstreut punktiert auf glattem Grund, der Vorderrand schwach gerundet, stumpf. Gesicht und Stirn deutlich und dicht punktiert, die Zwischenräume fein gerunzelt, wenig glänzend. Scheitel und Schläfen fein punktiert auf fein gerunzeltem Grund, mit stärkerem Glanz. Schläfen 1,1 mal so lang wie die Breite der Augen, direkt hinter den Augen wenig erweitert (♀) oder parallel (♂). Wangenleiste schmal, die Mundleiste in einiger Entfernung von der Mandibelbasis treffend, das Ende der Mundleiste nicht verbreitert. Abstand der hinteren Ocellen etwa so groß wie der Augen-Ocellen-Abstand. Fühlergeißel mit 27-28 Gliedern, alle Glieder länger als breit, die vorletzten Glieder 1.3 mal so lang wie breit.

Brust. Mesoscutum fein und dicht punktiert auf sehr fein gerunzeltem Grund, ziemlich glänzend, die Notauli kaum eingesenkt. Mesopleuren überwiegend grob und dicht punktiert, die Zwischenräume mit schwacher Struktur, glänzend, Speculum groß, unpunktiert, fast glatt, Eindruck vor dem Speculum ebenfalls unpunktiert, mit sehr feiner Körnelstruktur, stark glänzend. Prepectalleiste schwach erhaben, dorsolateral weit vor dem Vorderrand endend. Propodeum kräftig und vollständig gefeldert, in den Feldern relativ fein punktiert und gerunzelt. Klauen ungekämmt.

Flügel. Areola geschlossen, schmal sitzend, der zweite rücklaufende Nerv kurz vor dem Außenwinkel ansetzend. Nervellus stark antefurcal, im unteren Drittel gebrochen. Beim Paratypus Flügel verkrüppelt.

Hinterleib. Erstes Tergit so lang wie breit, kräftig und sehr dicht runzlig punktiert, die Dorsalkiele kräftig entwickelt, bis fast zum Ende reichend. Die folgenden Tergite ebenfalls deutlich und sehr dicht runzlig punktiert, die letzten Tergite feiner punktiert und glänzender. Bohrerscheiden schmal, etwas nach oben gebogen, anscheinend nicht über die Hinterleibsspitze vorragend (bei dem einen bekannten Weibchen).

Färbung ♀. Schwarz. Gelb oder rotgelb: Mandibeln ohne Zähne, Endrand des Schaftes und Tegulae. Rot: Unterseite der Fühlergeißel, Hinterecken des Pronotums und alle Beine ohne die Hüften. Stigma dunkelbraun.

Färbung ♂ entspricht dem ♀, aber: Gelb: Mundteile, Clypeus, Gesicht, Wangen, Unterseite der Fühler, Hinterecken des Pronotums, Tegulae, Linien unter den Flügeln, Hüften und Trochanteren I und II, schmale Seitenränder und untergeschlagene Epipleuren der Hinterleibstergite 1-4. Hinterränder der Tergite 2-6 schmal hell, Sternite 5-8 dunkel mit gelbem Hinterrand. Rot: Spitze der Hüften III und Rest der Beine.

Lethades imperfecti, spec. nov. (♀, ♂)

Typen. Holotypus: ♀, "Radnor, EM. 28.4.61. Larch. Forest Res. Stn. Farnham, Surrey", "Ex *Pachynematus imperfectus* Zadd.", "Pres by Comm Inst Ent, BM 1974-1" (London). - Paratypen (alle aus dem gleichen Wirt): 1♀, 1♂, vom gleichen Fundort, Schlüpfdaten 3.2.61 und 10.3.61 (London); 2♀♀, 3♂♂, "Mortimer, 20.4.59. Larch, Forest Res. Stn. Farnham, Surrey" (London, 1♀, 1♂ Hinz); 1♀, 1♂, vom gleichen Fundort, 21.4.53 (London); 1♂, "Ex *Pachy. imperfectus*, Dean, 15.4.53, Larch", "England, GW, Pres. by Forestry Commission, B.M. 1955-384" (London); 1♀, "Ex *Py. imperfectus*, Alice Holt, 3/5/54, EL", "England, SR, Pres. by Forestry Commission, B.M. 1958-195" (London); 1♀, 1♂, "France, Ferrette, 8.5.65" (bzw. "... 21.5.66") (Hinz); 1♀, "Germany, Freiburg 904, 10.5.66" (Oberrhein) (Delémont); 1♀, 1♂, ohne Fundortangabe (Delémont).

Weitere Exemplare von den Fundorten Kappel bei Freiburg/Oberrhein und Engadin/Schweiz (Delémont) wurden nicht als Paratypen beschriftet, weil sie zu defekt sind.

Beschreibung

Länge der Vorderflügel. 4.4-5.0 mm.

Kopf. Clypeus deutlich vom Gesicht getrennt, sehr zerstreut punktiert, die Zwischenräume basal fein gerunzelt, apical glatt, der Vorderrand gerundet, stumpf. Gesicht, Stirn, Scheitel und Schläfen dicht und fein gerunzelt, matt, die Schläfen etwas glänzender. Gesicht in der Mitte schwach kielförmig erhaben. Schläfen etwa so lang wie die Breite der Augen, direkt hinter den Augen kaum verschmälert (von oben gesehen). Wangenleiste schmal, die Mundleiste in einiger Entfernung von der Mandibelbasis treffend, das Ende der Mundleiste nicht verbreitert. Abstand der hinteren Ocellen etwa so groß wie der Augen-Ocellen-Abstand. Fühler relativ schlank, die Geißel mit 28-31 Gliedern, das dritte Geißelglied beim Weibchen 2.3-2.8 mal, beim Männchen 2.2-2.4 mal so lang wie breit, die vorletzten Glieder etwa 1.4 mal so lang wie breit.

Brust. Mesoscutum fein gerunzelt und sehr fein punktiert, relativ glänzend, teilweise in den Zentren des Mittellappens und der Seitenlappen mit fast glattem Grund, die Notauli kaum eingesenkt, aber durch eine etwas stärkere Runzelung abweichend. Mesopleuren fein gerunzelt und sehr fein punktiert, etwas glänzend, das Speculum glatt. Prepectalleiste schwach erhaben, dorsolateral weit vor dem Vorderrand endend. Propodeum vollständig gefeldert, nur Area basalis und Area superomedia nicht getrennt, in den Feldern fein gerunzelt, matt. Klauen ungekämmt.

Flügel. Areola kurz gestielt oder punktförmig sitzend, der zweite rücklaufende Nerv kurz vor dem Außenwinkel ansetzend. Nervellus stark antefurcal, im unteren Viertel gebrochen.

Hinterleib. Erstes Tergit 1.2-1.3 mal so lang wie am Ende breit, dicht und fein gerunzelt und sehr fein punktiert, relativ matt, die Dorsalkiele nur ganz basal angedeutet. Die folgenden Tergite ebenfalls dicht und fein gerunzelt und sehr fein punktiert, die letzten Tergite glänzender, mit fast glattem Grund. Bohrerscheiden fast gerade, schmal, über die Spitzen der Cerci wenig, über die Spitze des Hinterleibs nicht hinausragend.

Färbung ♀. Schwarz. Gelb: Taster, Mandibeln größtenteils, Hinterecken des Pronotums, Tegulae, Flügelbasis. Rot: Beine ohne die Hüften, Hinterende des ersten und das zweite bis dritte (oder vierte) Tergit. Tarsen III verdunkelt. Stigma dunkelbraun.

Färbung ♂. Zusätzlich gelb: Clypeus, Gesicht, Wangen bis hinter die Augen, Ventralhälften von Schaft und Pedicellus, Linien unter den Flügeln, Hüften und Trochanteren I und II, Spitzen der Hüften III, gelegentlich Mesoscutum lateral vor den Tegulae. Hüften I und II gelegentlich basal schwarz. Zweites Hinterleibstergit häufig basal mit zwei dunkel Flecken oder einer dunklen Querbinde.

Die Art wurde von Zinnert (1969, p. 195) als "*Trematopygus* spec. ? *curvispina* Thoms." (det. Kerrich), von Hinz (1976, p. 104) als *Lethades facialis* (Brischke) bezeichnet. Sie ist *L. curvispina* (Thomson) sehr ähnlich und unterscheidet sich im wesentlichen nur durch die etwas längeren und schlankeren Fühler und die kaum gerunzelten Mesopleuren (vgl. Bestimmungsschlüssel). Da in jedem einzelnen dieser Merkmale Übergänge vorkommen, hätte sich die Art ohne das Vorliegen einer längeren Zuchtserie nicht abtrennen lassen. Andererseits liegt Material aus Netz- oder Fallenfängen, das sich der neuen Art hätte zuordnen lassen, bis jetzt nicht vor.

Lethades poloniae, spec. nov. (♀)

Typen. Holotypus: ♀, "Poland, Hamernia at Warszawa, D6 grad zn 26.-4.6.76 leg. Ekipa IZ PAN" "884" (Warszawa). - Paratypus: 1♀, "Lomna k W-wy Db-korony 28.5.74 zn" (bei Warszawa) (Hinz).

Beschreibung

Länge der Vorderflügel. 5.4-5.8 mm.

Kopf. Clypeus undeutlich vom Gesicht getrennt, zerstreut punktiert, die Zwischenräume glatt, der Vorderrand schwach gerundet, stumpf. Gesicht sehr dicht punktiert, die Mitte schwach kielförmig erhaben, schwach glänzend. Stirn sehr dicht punktiert, schwach glänzend. Schläfen wenig kürzer als die Breite der Augen, von Beginn an etwas verschmälert (von oben gesehen), wie der Scheitel und die

Wangen dicht punktiert auf glattem Grund, schwach glänzend. Wangenleiste schmal, die Mundleiste in einiger Entfernung von der Mandibelbasis treffend, das Ende der Mundleiste etwas verbreitert. Abstand der hinteren Ocellen etwa so groß wie der Augen-Ocellen-Abstand. Fühler mäßig lang, die Geißel mit 32-34 Gliedern, die ersten Glieder verlängert, das dritte Geißelglied 2.1 mal, die Glieder im letzten Drittel etwa so lang wie breit.

Brust. Mesoscutum dicht punktiert, mit glatten Zwischenräumen, die Notauli kaum erkennbar. Mesopleuren dicht punktiert, glänzend, das Speculum stark glänzend, überwiegend glatt, davor einige Längsrunzeln. Prepectalleiste schwach erhaben, dorsolateral weit vor dem Vorderrand endend. Propodeum nur mit Area petiolaris, grob und dicht punktiert auf glattem Grund, glänzend. Klauen aller Beine deutlich gekämmt, an den Hinterbeinen Kammzähne mehr als halb so lang wie der Endzahn.

Flügel. Areola höchstens ganz kurz gestielt, der zweite rücklaufende Nerv interstitial. Nervellus stark antefurcal, im unteren Drittel oder Viertel gebrochen.

Hinterleib. Erstes Tergit 1.1 mal so lang wie am Ende breit, ohne Dorsalkiele, dicht punktiert auf glattem Grund, schwach glänzend. Die folgenden Tergite dicht punktiert auf glattem Grund, schwach glänzend, die Punktierung zum Ende schwächer werdend, die letzten Tergite schwach punktiert, stark glänzend. Bohrerscheiden schmal, fast gerade, wenig über die Cerci und nicht über die Hinterleibsspitze vorragend.

Färbung ♀. Schwarz. Gelb: Taster, Mandibeln größtenteils, Tegulae, Flügelbasis und die schmalen Hinterränder aller Tergite. Rot: Beine ohne die Hüften. Stigma fast schwarz.

Die Art zeichnet sich durch die deutlich gekämmten Klauen und durch das fast ungefelderte Propodeum aus.

Lethades schmiedeknechti, spec. nov. (♀)

Holotypus: ♀; "Allemagne Thuringen 1888 Schm.", unterseits "Schmiedeknecht", "Collection Dr. J. Tosquinet" (Bruxelles).

Beschreibung

Länge der Vorderflügel. 5.1 mm.

Kopf. Clypeus durch einen flachen Eindruck vom Gesicht getrennt, grob punktiert, an der Seite querrunzlig, glänzend, der Vorderrand schwach gebogen, stumpf. Gesicht dicht runzlig punktiert, kaum glänzend. Stirn grob querrunzlig, seitlich punktiert, mit undeutlicher Mittellinie, schwach glänzend. Schläfen wenig länger als die Breite der Augen, direkt hinter den Augen wenig verengt (von oben gesehen). Scheitel und Schläfen grob punktiert, die Zwischenräume mit Struktur, die Wangen runzlig punktiert. Wangenleiste schmal, die Mundleiste nahe der Mandibelbasis treffend, das Ende der Mundleiste etwas verbreitert. Abstand der hinteren Ocellen etwa so groß wie der Augen-Ocellen-Abstand. Fühler ziemlich kurz, die Geißel mit 24 Gliedern, die Basalglieder verlängert, das dritte Geißelglied 2.4 mal, die Glieder vor der Spitze etwa so lang wie breit.

Brust. Mesoscutum deutlich und dicht punktiert auf fein strukturiertem Grund, ziemlich matt, Notauli nur durch einige Runzeln angedeutet. Mesopleuren grob runzlig punktiert, das Speculum glänzend und fast glatt, davor grobe Längsstreifen. Prepectalleiste dorsolateral den Vorderrand erreichend. Propodeum mit deutlichen Leisten, aber ohne Costula, grob punktiert, glänzend. Klauen nicht gekämmt.

Flügel. Areola fehlend. Nervellus stark antefurcal, im unteren Viertel gebrochen.

Hinterleib. Erstes Tergit wenig länger als hinten breit, deutlich fein und dicht punktiert auf fast glattem Grund, ohne Dorsalkiele. Die folgenden Tergite ebenso strukturiert, etwas glänzend, die letzten Tergite sehr fein punktiert, glänzend. Bohrerscheiden schmal, schwach gebogen, den Hinterleib nicht überragend.

Färbung ♀. Schwarz. Rot: Taster, Mitte der Mandibeln, Basis der Fühlergeißel, Beine ohne die Hüften und die schwarzen Spitzen der Schenkel und Schienen III, breiter Endrand des ersten und das zweite bis vierte Hinterleibstergit. Tegulae dunkelbraun. Stigma hellbraun.

Die Determination der Art nach Townes (1970, p. 68) führt wegen der dorsolateral nicht verkürzten Prepectalleiste zu *Glyptorhaestus* Thomson. Sie weicht aber von dieser Gattung durch die offene Areola und die schmalen Bohrerscheiden ab. Die Art wird deshalb provisorisch zu *Lethades* gestellt.

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29. Wright, J. W. & L. J. Vitt (ed.): Biology of Whiptail Lizards (Genus *Cnemidophorus*). - Herpetol. League Spec. Publ. No. 3, Oklahoma Museum of Nat. Hist, Oklahoma, 1993. 417 S., 83 Abb., 40 Tab. ISBN 1-883090-01-6.

Der Titel des Buches wird dem Inhalt gerecht: eine ausführliche Biologie der zu den Schienenechsen gehörenden Rennechsengattung *Cnemidophorus*. Die Anregung zu diesem Sammelband von 15 Einzelbeiträgen verschiedener Autoren geht auf ein Symposium gleichen Namens zurück, das an der Universität Oklahoma im August 1984 abgehalten wurde. Die Themen befassen sich vor allem mit der Evolution der Gattung, mit Nahrungsaufnahme, Thermoregulation Aktivitätsmustern, Fortbewegung, Fortpflanzung, Überwinterung, Sozialverhalten, Populations-Ökologie und Parthenogenese. Damit entsteht ein umfassendes Lebensbild der Gattung *Cnemidophorus* mit ihren 6 Artengruppen (*cozumela, deppii, lemniscatus, sexlineatus, tesselatus, tigris*) und 56 bis dato beschriebenen Arten. Die Beiträge sind knapp und übersichtlich gehalten; Grafiken, Verbreitungskarten, Fotos und Tabellen ergänzen die Texte. Jeder Einzelaufsatz ist mit einem Literaturverzeichnis versehen. Selbstverständlich gibt es auch einen Index. Das Buch ist für jeden, der sich mit der Gattung *Cnemidophorus* beschäftigen will, eine unerläßliche Informationsquelle.

U. Gruber

30. Dixon, J. R., Wiest, J. A. jr., & J. M. Cei: Revision of the Neotropical Snake Genus *Chironius* Fitzinger (Serpentes, Colubridae). - Monografie XIII, Museo Regionale di Scienze Naturali, Torino, 1993. 279 S., 21 Farbabb., 64 Abb. u. Karten s/w, 26 Tab. ISBN 88-86041-05-5.

Die 13 Arten der Gattung *Chironius* werden in diesem Werk ausführlich dargestellt. Nach einer Einführung über den Status und die Geschichte der Gattung, die verwendeten Merkmale und nach einem Bestimmungsschlüssel folgt Art für Art die Beschreibung. Dabei wird ein übersichtliches Schema verwendet, das unter folgenden Stichworten angeordnet ist: Artname, Synonymieliste,, Typus, Diagnose, Verbreitung mit Verbreitungskarte, morphologische Beschreibung, Färbung, Variation, Lebensbild, Bemerkungen. Jede Art ist mit einer Schwarzweißabbildung oder einem Farbbild dokumentiert. Diagramme oder Abbildungen von Rücken-Beschuppung und Hemipenis verdeutlichen den Text. *Chironius laurenti* als Art sowie *C. fuscus leucometapus*, *C. multiventris septentrionalis* und *C. quadricarinatus maculoventris* als Unterart werden neu beschrieben. An die Artbeschreibungen schließen sich noch Kapitel zu interspezifischen und intergenerischen Beziehungen mit Bemerkungen zur Zoogeographie und Evolution von *Chironius* sowie eine Zusammenfassung der taxonomischen Änderungen an. Das Literaturverzeichnis ist umfangreich, ebenso die Liste des untersuchten Materials im Appendix. Eine fleißige monographische Arbeit von drei wirklichen Kennern der südamerikanischen Herpetofauna. Wer immer sich mit den Colubriden Südamerikas beschäftigt, wird an diesem Band nicht vorbeikommen.

U. Gruber

31. Gavetti, E. & F. Andreone: Revised Catalogue of the Herpetological Collection in Turin University, I. Amphibia. - CATALOGHI X, Museo Regionale di Scienze Naturali, Torino, 1993. 185 S., 13 s/w Taf. ISBN 88-86041-08-X.

Sammlungskataloge großer Museen sind für den wissenschaftlich arbeitenden Museumszoologen von außerordentlichem Wert. Deshalb muß man auch diesen Katalog des Turiner Naturkundemuseums sehr begrüßen. Der Aufbau des Textes ergibt sich aus dem natürlichen System und der Menge des vorhandenen Materials. Als besonders angenehm empfindet man, daß nach dem Art- oder Unterartnamen und der Katalognummer sofort groß hervorgehoben das Herkunftsland angegeben wird. Bei jeder Nummer ist auch die entsprechende Stückzahl und die Art der Aufbewahrung verzeichnet. Das Gesamtmaterial wird in 2 Listen unterteilt: die Exemplare des Zoologischen Museums und diejenigen des Museums für vergleichende Anatomie. Den Schluß des Buches bilden eine Typenliste, ein Literaturverzeichnis, ein Register und eine Tafelfolge mit Abbildungen der Typen.

U. Gruber

SPIXIANA	19	3	281–288	München, 01. November 1996	ISSN 0341-8391

Vergleichende Untersuchungen über die Größe und Form der Augenflecken am Analwinkel der Hinterflügel von *Iphiclides podalirius podalirius* (Linnaeus, 1758) und *I. podalirius feisthamelii* (Duponchel, 1832)

(Insecta, Lepidoptera, Papilionidae)

Von **Th. A. Wohlfahrt**

Wohlfahrt, Th. A. (1996): A comparative analysis of size and form of the ocelli at the anal angle of the hindwings in *Iphiclides podalirius podalirius* (L.) and *I. podalirius feisthamelii* (Dup.) (Insecta, Lepidoptera, Papilionidae). – Spixiana **19/3:** 281-288

The size and form of the ocelli at the anal angle of the hindwings in the scarse swallowtails *Iphiclides podalirius podalirius* and *podalirius feisthamelii* were compared by means of a novel adequate algorythm. The quantitative analyses included specimens of both sexes from both the spring generations and the summer generations, respectively. The values for male and female individuals being alike, there were found statistically significant differences between the subspecies themselves: The ocelli of *Iphiclide podalirius feisthamelii* as compared to those of *I. podalirius podalirius,* proved to be smaller by a factor of 0.9. In the summer generation of both subspecies they enlarged equally by a factor of 1.1. As for the variability of their shape, there were no differences. It rather depended on the overall body-size of the specimens.

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Einleitung

Vom Segelfalter gibt es zwei Subspecies: *Iphiclides podalirius podalirius* (Linnaeus, 1758) (Westeuropa bis Zentralasien) und *podalirius feisthamelii* (Duponchel, 1832) (Iberische Halbinsel, Nordafrika). Sein besonderes Zeichnungselement ist der Augenfleck am Analwinkel der Hinterflügeloberseite, im folgenden als Analauge (AA) bezeichnet. Er variiert in Form wie Ausdehnung erheblich; außerdem wird sein Bild von der ihn umgebenden Tönung wesentlich beeinflußt. Durch die verschiedene Ausprägung der schwarzen Bereiche erscheinen subjektiv die sehr viel "ausdrucksvolleren" AA des *feisthamelii* gegenüber denen von *podalirius* beinahe größer. Genauere Betrachtung ergab Widersprüche bezüglich der Proportionen, Größe und Lage im Verhältnis zur Flügelfläche, wodurch die folgenden Untersuchungen angeregt wurden. Im Verlauf der Arbeit erwies sich die Größe der AA zunehmend bedeutungsvoller. So erschien es wichtig, diese bei den beiden Unterarten des Segelfalters genauer zu erfassen und vergleichend darzustellen.

In der Literatur ist über die in Frage stehende Zeichnung wenig zu finden. Den Bestimmungsbüchern genügen Hinweis und Abbildung. Wohlfahrt (1979) konnte bezeichnende Unterschiede in der Farbverteilung zwischen der gen. vern. und der gen. aest. des *podalirius* feststellen. Daraus ergab sich bereits hier als Folgerung, daß die AA der gen. aest. größer als diejenigen der gen. vern. sind.

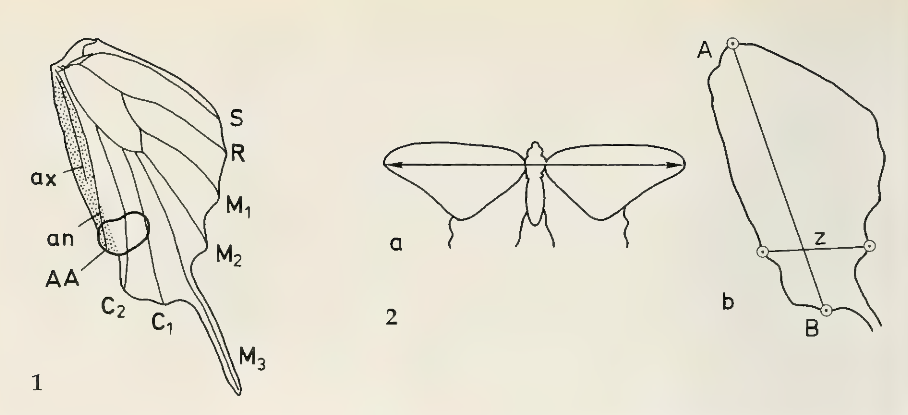


Abb. 1. *Iphiclides podalirius.* Hinterflügel, Geäder und Lage des Analauges. Punktiert: Bereich des nach unten umgeschlagenen Analrandes. ax = Axillaris, an = Analis, AA = Analauge.
Abb. 2. *Iphiclides podalirius.* a = Flugspanne; b = Meßstrecken am Hinterflügel: AB = Hinterflügellänge, z = Hinterflügelbreite.

Material

Die Untersuchungen wurden an n = 290 Freilandfaltern durchgeführt. Da ♂♂ und ♀♀ beider Generationen aus 14 Gebieten einbezogen sind, bedarf es einer Begründung der Auswahlkriterien für dieses verhältnismäßig geringe Material. Wichtigste Bedingung zur Bearbeitung der Proportionen an den AA ist einwandfreie Präparation. Die Analwinkel der Hinterflügel müssen völlig plan gespannt sein, was bei allen Segelfaltern auf große Schwierigkeiten stößt, weil der Analrand normal nach unten umgeschlagen ist (Seitz 1909). Hierdurch entstehen bei ungenauem Spannen gepreßte Falten (Abb. 1), die ein genaues Erfassen der AA unmöglich machen. Kontur und Zeichnung der Flügel erscheinen völlig verändert, wie bei Seitz (1909) im Abb.-Band 1 auf Taf. 7 Reihe c deutlich wird. Nachspannen führt selten zum Ziel, denn die sperrigen Adern können kaum korrigiert werden, ohne die Flügel erheblich zu verletzen. Hinzu kommt, daß *podalirius* neben der Analis eine deutliche Axillaris aufweist, die den Umschlagsrand zusätzlich verstärkt (Abb. 1). In Anbetracht dieser Gegebenheit blieb von dem sehr großen zur Verfügung stehenden gesamten Material nur die am Anfang genannte Anzahl von n = 290 Faltern übrig. Ihre Herkunft und zahlenmäßige Aufgliederung zeigt Tab. 1.

Aus Tab. 1 geht hervor, daß nicht alle geeigneten Falter statistisch ausgewertet wurden. Um die zu vergleichenden Reihen nicht zu groß werden zu lassen und zugleich einer unbewußten Auswahl vorzubeugen, wurden die Falter der einzelnen Populationen eines Großgebietes in zufälliger Reihenfolge in einer bestimmten Himmelsrichtung geordnet zusammengeschrieben und dann jeder 3. und bei geringeren Anzahlen jeder 2. Falter in die Berechnung einbezogen, so daß die Variabilität der gesamten Großpopulation erfaßt war. Randgebiete der Verbreitung wurden ebenso wie kleine Sonderpopulationen für grundlegende Tests nicht berücksichtigt, jedoch zu Vergleichen herangezogen.

Methoden

Zur Aufbereitung der AA-Werte für Größenvergleiche sind Faltergröße und Hinterflügellänge von Bedeutung. Als Maß für die Größe dient zweckmäßig die Flugspanne f (Abb. 2a) (Wohlfahrt 1979). Die Hinterflügellänge (HL) bestimmt sich aus der geradlinigen Verbindung des Vorderrandes nächst der Flügelwurzel mit dem distalen Ende der Ader C_1 (Abb. 2b). Die Werte für f und HL sind so gut korreliert, daß HL an Stelle von f gesetzt werden kann (n = 15 ♂♂ gen. vern. Unterfranken, r ≈ 0.98). Im Verlauf der Untersuchungen wurde auch die Hinterflügelbreite (HB) wichtig (Abb. 2b).

Da es nach der Fragestellung bei AA nur um die Alternative "größer" oder "kleiner" geht, ist die absolute Größe belanglos; es genügt ein Maß, das einen relativen Unterschied erkennbar macht. Zu diesem Zweck wurden Höhe und Breite jedes AA mit Hilfe eines auf 0.5 mm geeichten Maßstabes

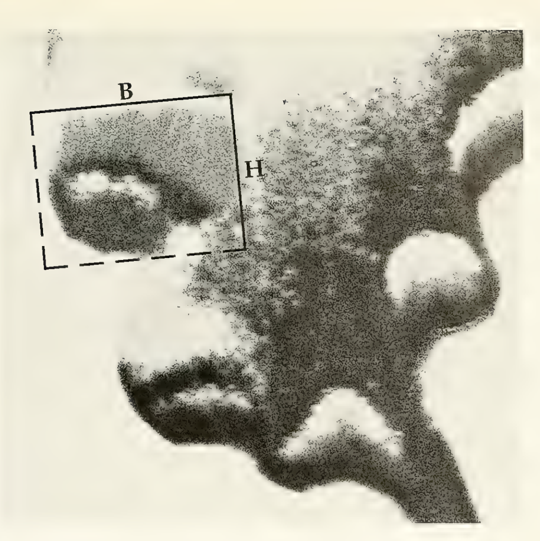


Abb. 3. *Iphiclides podalirius*. Meßstrecken am Analauge: H = Höhe, B = Breite.

bestimmt, wobei besonders darauf zu achten war, daß die beiden Achsen senkrecht zueinander stehen. Durch Verschiebung bis an den Rand des AA werden die Achsen zu Tangenten, aus denen sich ein Rechteck berechnen läßt, welches das AA eben umgreift (Abb. 3). Die außerhalb der AA liegenden Restflächen können vernachlässigt werden, weil sich die Fehler durch die Variabilität der AA-Form gegenseitig aufheben. Zum Vergleich der AA war notwendig, die einzelnen Rechtecke auf einen gemeinsamen Nenner zu bringen. Man kann gedanklich jedes der Rechtecke in ein flächengleiches Quadrat transformieren, dessen Kantenlänge als Quadratwurzel aus der Fläche des Rechtecks gegeben ist. Die Kantenlängen entsprechen nunmehr den AA-Größen. Um die Faltergröße f auszuschalten wurden zuvor alle AA-Höhen (AAH) und AA-Breiten (AAB) in % der HL der betreffenden Falter

Tab. 1. *Iphiclides podalirius*, Herkunft und Einsatz des Materials; statistisch verwendete Anzahlen durch Fettdruck hervorgehoben.

Gebiet	gen. vern.				gen. aest.			
	♂♂ n =		♀♀ n =		♂♂ n =		♀♀ n =	
Unterfranken, Umg. Karlstadt (Main)	11	**3**	6	**3**	11	**4**	4	**2**
Unterfranken, Umg. Karlstadt (Main)	17	**17**						
Nordtirol, Kauner Tal	10	**5**	6					
Südfrankreich, Thezan (Herault)	9	**3**	5	**3**	6	**2**	6	**3**
Norditalien, Andora bei Laigueglia	10	**3**			10	**3**		
Dalmatien, Insel Korcula	10	**4**	7	**3**	10	**4**	5	**3**
Griechenland, Umgebung Thessaloniki	8		10	**5**			12	**6**
Griechenland, Umgebung Kalamata	15	**4**						
SO-Türkei, Prov. Hakkari, Dez-Tal	5	**5**			5	**5**		
SW-Frankreich, Vernet les Bains	15	**5**			15	**5**		
Katalonien Massanet-Massanas	10	**4**			10	**4**		
Katalonien Blanes	7	**2**			9	**3**		
O-Spanien, versch. Fundorte			7	**6**			9	**9**
N-Afrika, Algerien, Marokko	3		1		2		1	
N-Afrika, Mittl. Atlas					1		2	
Σ_n	130	**55**	42	**20**	79	**30**	39	**23**
Insgesamt: 290 (**128**) Falter								

ausgedrückt. Damit werden die Kantenlängen der Quadrate zu allgemein vergleichbaren Meßstrecken. Die derart errechneten Zahlen sind im folgenden als AA-Werte bezeichnet. Ein höherer AA-Wert bedeutet, daß die betreffenden AA relativ größer sind als solche mit niedereren Werten. Die Sicherung der Unterschiede zwischen den Kollektiven erfolgte vermittels Wilcoxon 2-Stichproben-Test (einseitig) (Pfanzagl, 1978) (W-Test). Die Mittelwerte ($\bar{n}$) der AA-Größen wurden auf nur eine Dezimale gerundet, damit der Eindruck einer nicht vertretbaren Genauigkeit vermieden wird. Die Aussage wird derart sehr viel klarer; an den Resultaten ändert sich praktisch nichts.

Voruntersuchungen an *Iphiclides podalirius podalirius* ♂♂

Zunächst waren Sicherheit und Tragfähigkeit der dargelegten Meß- und Berechnungsmethoden zu ermitteln, also die Streuung S eines Kollektivs und sein Verhalten im Vergleich mit Kollektiven anderer Fundorte. Als Ausgangsdaten für die Testgrößen dienten $n = 17$ ♂♂ gen. vern. vom selben Fundort aus Unterfranken ($\bar{n} \approx 14.2$; $S \approx \pm 1$; $m \approx 0.25$) gegen $n = 17$ ♂♂ gen. vern. des Großgebiets "Europa", bestehend aus Unterfranken ($n = 3$), Südfrankreich ($n = 3$), Norditalien ($n = 3$), Dalmatien ($n = 4$) und Griechenland ($n = 4$) (Tab. 1), als deren gemeinsame AA-Werte sich $\bar{n} \approx 14.1$; $S \approx \pm 1.27$ und $m \approx 0.31$ ergaben. Die Werte stimmen gut überein, eine Verschiedenheit ist mit W-Test nicht nachweisbar. Dasselbe gilt für den Vergleich des *podalirius* mit seiner f. *inalpina* Vrty. (Wohlfahrt, 1978) ($n = 5$; $\bar{n} \approx 14.1$; $S \approx \pm 0.7$; $m \approx 0.31$). Von besonderem Interesse war ein Vergleich dieser Werte mit denen einer geographisch sehr weit entfernten Population, wofür $n = 5$ Falter aus Kleinasien (SO-Türkei, Prov. Hakkari, Dez-Tal) zur Verfügung standen. Die Werte ihrer AA betragen $\bar{n} \approx 14.1$; $S \approx \pm 1.08$; $m \approx 0.49$, liegen also sämtlich im Bereich der Europa-Werte. Entsprechend ergab auch der W-Test keinen Unterschied. Die Ergebnisse werden den gestellten Anforderungen gerecht; folglich sind die Methoden für die folgenden Untersuchungen geeignet.

Größe der Analaugen von *I. podalirius podalirius*

Im vorigen Abschnitt war bereits gefunden worden, daß der AA-Wert in der gen. vern. im untersuchten Verbreitungsgebiet einheitlich ≈ 14.1 beträgt. Aus Zeichnungselementen war zu schließen, daß die Sommerfalter gegenüber der gen. vern. eine größere Augenzeichnung aufweisen (Wohlfahrt 1979), dem entsprechend müßten ihre AA-Werte höher sein. Ein Vergleich der ♂♂ beider Generationen vom selben Fundort aus Unterfranken erbrachte die Bestätigung: gen. vern. ($n = 17$) $\bar{n} \approx 14.2$ und gen. aest. ($n = 11$) $\bar{n} \approx 15.9$. Die AA der gen. aest. können nach den Ergebnissen der Voruntersuchungen in sich ebenfalls als einheitlich angenommen werden. Sie sind im vorliegenden Fall ≈ 1.1 mal größer als diejenigen der gen. vern.; der Unterschied besteht mit 99.5 % Sicherheit (W-Test). Es war zu erwarten, daß auch die Unterschiede in weiträumigen Populationen ungefähr in derselben Größenordnung liegen. Folgende Werte wurden verglichen: Europa vern. ($n = 17$, $\bar{n} \approx 14.1$) mit aest., vertreten durch Unterfranken ($n = 4$), Südfrankreich ($n = 2$), Norditalien ($n = 3$) und Dalmatien ($n = 4$), zusammen $n = 13$ Falter (Tab. 1) mit der gemeinsamen AA-Größe $\bar{n} \approx 15.4$. Die AA-Werte aest. sind auch hier größer, und auch dieser Unterschied ist mit 99.5 % gesichert (W-Test). Der Faktor der Vergrößerung beträgt ebenfalls ≈ 1.1. Die selben Werte zeigen entsprechend der gen. vern. auch $n = 5$ ♂♂ gen. aest. aus der SO-Türkei (Prov. Hakkari, Dez-Tal). Um die Einheit *podalirius podalirius* vollständig zu erfassen, wurden zur Ergänzung Ergebnisse an ♀♀ (Europa, Tab. 1) herangezogen: gen. vern. ($n = 14$), $\bar{n} \approx 14.5$ und gen. aest. ($n = 14$), $\bar{n} \approx 15.8$). Der Vergrößerungsfaktor beträgt auch hier ≈ 1.1; der Unterschied ist mit 97.5 % immer noch gut gesichert (W-Test). Zusammenfassend kann gesagt werden:

1. Die AA der subspec. *podalirius* ♂♂ und ♀♀ sind in der gen. aest. gegenüber der gen. vern. um den Faktor ≈ 1.1 größer.

Größe der Analaugen von *I. podalirius feisthamelii* und Vergleiche mit *I. podalirius podalirius*

Für die folgenden Beurteilungen wurde zunächst Einheitlichkeit innerhalb der Spezies *podalirius* angenommen, so daß die im vorstehenden Kapitel genannten Tatsachen auch für die subspec. *feisthamelii* gelten müßten. Nunmehr wurden die AA der *podalirius* gen. vern. ♂♂ mit denen der gen. vern. der subspec. *feisthamelii* verglichen. Den n = 17 *podalirius* der Populationsgruppe Europa (AA-Größe n̄ ≈ 14.1) standen n = 11 Falter aus SW-Frankreich und Katalonien gegenüber (Tab. 1). Diese zeigten jedoch nur einen AA-Wert von n̄ ≈ 12.6, also gegenüber der subspec. *podalirius* eine Verkleinerung um den Faktor ≈ 0.9.

Der W-Test ergab 99.5 % Sicherung des Unterschieds. Ebenso erwiesen sich die AA der gen. aest. ♂♂ *feisthamelii* (n = 12, AA n̄ ≈ 13.4) gegenüber denen von *podalirius* (n= 13, AA n̄ ≈ 15.4) um den Faktor ≈ 0.9 kleiner, und auch hier besteht der Unterschied mit 99.5 % Sicherheit (W-Test). Bei den ♀♀ liegen die AA-Werte im Verhältnis etwa in derselben Größenordnung: gen. vern. *podalirius* (n = 14) n̄ ≈ 14.5 gegen *feisthamelii* (n = 6) n̄ ≈ 12.8 (Unterschied der n̄ ≈ 97.5 % gesichert, W-Test) und gen. aest. *podalirius* (n = 14) n̄ ≈ 15.8 gegen *feisthamelii* (n = 9) n̄ ≈ 14.3 (Sicherung W-Test 99.5 %). Zusammenfassend kann festgestellt werden:

2. Die AA der subspec. *feisthamelii*-Falter sind um den Faktor ≈ 0.9 kleiner als diejenigen der subspec. *podalirius*, und zwar bei den ♂♂ und ♀♀ beider Generationen.

Nach 1. sind die AA bei *podalirius podalirius* in der gen. aest. gegenüber der gen. vern. allgemein größer. Zum Vergleich wurden die entsprechenden Werte für *feisthamelii* berechnet: ♂♂ gen. vern. (n = 11) n̄ ≈ 12.6 gegen gen. aest. (n = 12) n̄ ≈ 13.4 und ♀♀ gen. vern. (n = 6) n̄ ≈ 12.8 gegen gen. aest. (n = 9) n̄ ≈ 14.3; auch hier erweisen sich die AA in der gen. aest. um den Faktor 1.1 größer.

3. Zwischen subspec. *podalirius* und subspec. *feisthamelii* besteht hinsichtlich der AA-Größe beider Geschlechter im Verhältnis der Frühjahrs- zu den Sommerfaltern kein Unterschied.

Die ssp. *feisthamelii* weist in ihren südlichen Verbreitungsgebieten (NW-Afrika von der Küste über den Atlas bis in die Oasen der Sahara) erheblich abgeänderte Modifikationen auf. Besonders unter der gen. aest. *latteri* Austaut werden Riesenexemplare gefunden, die in den Flügelproportionen und damit auch in der Zeichnung abweichen. Der Übergang zu den südeuropäischen *feisthamelii* ist fließend, so daß die Zugehörigkeit zu dieser Subspezies ohne Zweifel steht. Obwohl nur wenige Falter verfügbar waren (Tab. 1), erschien es angebracht, die AA-Größen in den Vergleich einzubeziehen. Die Werte betrugen: ♂♂ gen. vern. NW-Afrika (n = 3) n̄ ≈ 13.7 gegen Katalonien (n = 11) n̄ ≈ 12.6; ♂♂ gen. aest. NW-Afrika (n = 3) n̄ ≈ 13.1 gegen Katalonien (n = 12) n̄ ≈ 13.4; ♀♀ gen. aest. NW-Afrika (n = 3) n̄ ≈ 13.5 gegen Katalonien (n = 9) n̄ ≈ 14.3. Der W-Test ergab in keinem Fall einen signifikanten Unterschied, so daß die Annahme, daß alle Kollektive als Teile ein und desselben Grundkollektivs aufgefaßt werden können, nicht widerlegt ist. Die Resultate sprechen also für Zusammengehörigkeit aller Ausprägungen innerhalb der ssp. *feisthamelii*.

Form der Analaugen

Mit der in der geschilderten Art durch Höhe und Breite berechneten Größe eines AA ist zugleich durch das Hilfsrechteck sein grober Umriß festgehalten. Wie der unbefangene Eindruck zeigt, ist die Variabilität dieser Form erheblich, sie reicht von längsoval über angenähert kreisrund bis zu einem Querband. Der Verdacht erschien berechtigt, daß sich in den Varianten Verschiedenheiten zwischen *p. podalirius* und *p. feisthamelii* verbergen. Ein Vergleich der AA-Formen wird durch den Quotienten AAH/AAB möglich (AAH/AAB = AA-Index AAI), dabei bedeutet AAI > 1 längsoval, AAI = 1 etwa kreisrund und AAI < 1 queroval bis bandförmig. Zum Vergleich der AAI wurde das subspec. *podalirius*-Kollektiv Europa (N = 17♂♂ gen. vern.) (Tab. 1) Wert 0.82 dem entsprechenden Kollektiv Katalonien (n = 11) Wert 0.78 gegenübergestellt. Nach W-Test ist kein Unterschied nachweisbar; damit können die beiden Kollektive als Teile eines Gesamtkollektivs aufgefaßt werden. Dasselbe ergab der Vergleich der gen. vern. ♀♀ Europa (n = 14) Wert 0.77 gegen Katalonien (n = 7) Wert 0.79. Auf Abb. 4 sind die Einzelwerte der Gesamtkollektive ♂♂ und ♀♀ jeweils zusammengefaßt als Summenkurven im Wahrscheinlichkeitsnetz eingetragen. Die Einheitlichkeit jedes Gesamtkollektivs tritt deutlich in Er-

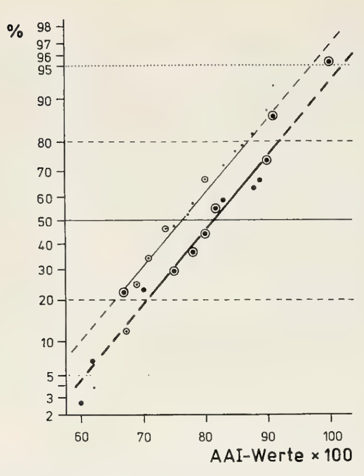


Abb. 4. *Iphiclides podalirius*. Analaugenindices ♂♂ (n = 28) und ♀♀ (n = 21) als Summenkurven im Wahrscheinlichkeitsnetz: Kräftiger gezeichnet ♂♂, schwächer gezeichnet ♀♀, Kreise: Punkte mehrfach belegt.

scheinung, wenn schon die ideale Normalverteilung in keinem Fall erreicht wird. Die Werte der ♀♀ liegen unter denen der ♂♂, danach sind die AA der ♀♀ allgemein mehr queroval. Die Gegenüberstellung der Individualwerte im Ansatz zum W-Test zeigt, daß die ♂♂ des *p. podalirius* gegenüber *p. feisthamelii* höhere Werte aufweisen; also neigen die AA hier mehr zur Kreisform, was auf einen Unterschied zwischen den beiden Subspecies hinweisen könnte. Aus diesen an sich geringfügigen Differenzen ist zu schließen, daß bei Zustandekommen der AA-Form besondere Faktoren wirksam werden. Um Klarheit zu schaffen, wurden n = 21 *p. podalirius* ♂♂ gen. vern. des Großraumes Europa in aufsteigender Reihenfolge der Hinterflügelbreite (HB) geordnet und jeweils die zugeordneten Werte für AAI, die Faltergröße f sowie für AAH und AAB eingetragen (Abb. 5). Aus Abb. 5 geht hervor, daß HB und AAH fast proportional mit f anwachsen, während AAB erheblich überproportional wächst, was sich im starken Abfall der AAI-Werte bei größeren Faltern auswirkt. Da die HB in sehr kleinen Schritten anwächst, schien es zweckmäßig, zwei benachbarte AAI mit W-Test zu vergleichen. Verwendet wurden *podalirius* ♂♂ gen. vern. eines Kollektivs Europa HB = 12 mm (n = 24) gegen HB = 13 mm (n =17). Der Unterschied der beiden AAI konnte mit 97.5 % gesichert werden (W-Test).

Um die Beziehungen zwischen den HB und AAI sauber zu erfassen, wurde nunmehr die Korrelation zwischen allen vier verwendeten HB und den zugeordneten AAI berechnet, wobei sich eine negative Korrelation ergab (r = -0.061; Abb. 6). Die erheblichen Streuungen der AAI sind wohl auf nicht erfaßbare biologische Faktoren zurückzuführen und gehören in den Blickwinkel Genotyp und Umwelt (Weber 1978).

4. Die Form der AA der species *podalirius* ist im Gegensatz zur AA-Größe nicht vom geographischen Gebiet, sondern von der absoluten Faltergröße abhängig.

Tab. 2. *Iphiclides podalirius*, relative Hinterflügelbreite (RHB) und Sicherheit der Unterschiede.

Subspecies	gen.		n	RHB	Unterschied-sicherung W-Test
podalirius (Europa)	**vern.**	♂♂	17	37,1	95,0 %
		♀♀	14	38,7	
	aest.	♂♂	13	39,4	97,5 %
		♀♀	14	41,2	
feisthamelii	**vern.**	♂♂	16	38,2	97,5 %
		♀♀	7	41,5	
	aest.	♂♂	12	40,0	99,5 %
		♀♀	9	43,5	

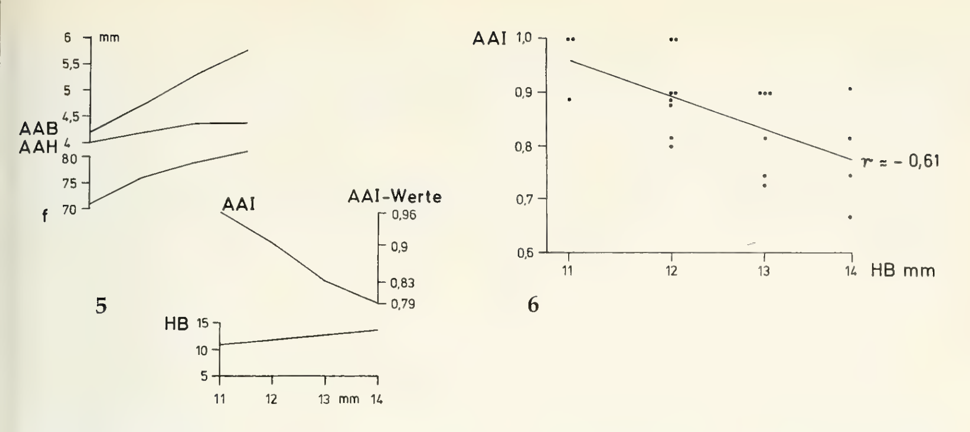


Abb. 5. *Iphiclides podalirius* gen. vern. n = 21♂♂, Vergleich der Werte für Faltergröße (f), Analaugenbreite (AAB), Analaugenhöhe (AAH) und Analaugenindices (AAI), bezogen auf die Hinterflügelbreite (HB).
Abb. 6. *Iphiclides podalirius*, gen. vern. n = 21♂♂, Analaugenindex (AAI) als Funktion der Hinterflügelbreite (HB).

Diskussion

Die Ergebnisse sind so eindeutig, daß sich eine Diskussion beinahe erübrigt. Sie sind am Ende jedes Abschnitts unter laufenden Nummern zusammengefaßt. Offen ist die Frage nach der taxonomischen Brauchbarkeit der AA: Ihr Größenunterschied tritt als weiteres Unterschiedsmerkmal zwischen *p. podalirius* und *p. feisthamelii* in Erscheinung. Sie ist nicht so auffallend wie die Schwärzung der Binden, die f. *ornata* Wheeler (Wohlfahrt 1980) und die Verschiedenheit der Grundfarbe der ♂♂ und ♀♀; dafür erweist sie sich als zuverlässiger in der Trennung, unabhängig von den Jahresbruten und von geographischen Barrieren. Eine allgemeine Verwendung als Schlüsselmerkmal erscheint trotzdem wenig zweckmäßig, weil das Feststellen der AA-Werte technisch aufwendig ist und bei ungenügender Präparation nicht ausgeführt werden kann. Immerhin könnten bei Zweifel die AA-Daten auf die Zugehörigkeit zu *podalirius* oder *feisthamelii* hinweisen. Von Interesse erscheint dagegen die AA-Größe als nachweisbare Verschiedenheit der beiden Unterarten.

Die auffallende Gleichheit der AA-Größen bei so weit entfernten Populationen wie der aus Europa und der aus der SO-Türkei ist wohl auf die Ausbreitungsgeschichte des *podalirius* zurückzuführen. Mit großer Wahrscheinlichkeit standen die Falter der SO-Türkei mit denen der kleinasiatischen S- und W-Küste und weiter mit den Populationen SO-Europas während der Würmeiszeit in Verbindung (Wohlfahrt 1985).

Da es im Abschnitt über die Form der AA darauf ankam, festzustellen, wodurch diese bedingt ist, wurde die folgende Frage zunächst nicht berücksichtigt, sie soll jedoch wegen ihrer grundsätzlichen Bedeutung angesprochen werden. Wie Abb. 4 zeigt, sind die AAI-Werte der ♂♂ durchwegs höher als die der ♀♀. Aus Abb. 5 geht hervor, daß bei größeren Faltern AAI erheblich absinkt. Wenn also die Werte der ♀♀ deutlich unter denen der ♂♂ liegen, so ist zu erwarten, daß die ♀♀ größere und vor allem breitere Hinterflügel haben. Die Eintragung der Werte in das Wahrscheinlichkeitsnetz läßt die Zusammengehörigkeit der Geschlechter ein und derselben Population nicht erkennen, so daß sich die Notwendigkeit ergibt, die Unterschiede unmittelbar nachzuweisen, also die entsprechenden HB in % der HL gegenüberzustellen. Als Unterlagen dienten die Falter der in den vorigen Abschnitten verwendeten Kollektive (Tab. 1). Die Werte und die Ergebnisse der Vergleiche sind in Tab. 2 zusammengestellt. Auf Tab. 2 wird der Sexualdimorphismus des *podalirius* im Vergleich mit Abb. 4 ebenfalls deutlich. Die ♀♀ haben durchwegs breitere Hinterflügel als die ♂♂. Die Hinterflügel des *feisthamelii* sind im Verhältnis etwas breiter als die des *podalirius*, doch ist der Unterschied so gering, daß er als Trennungsmerkmal kaum ins Gewicht fällt. In der gen. vern. von *podalirius* kann durch die klimatischen Verschiedenheiten im Bereich des Großkollektivs Europa an variable sekundäre Einflüsse gedacht werden. Zuletzt ist daran zu denken, daß bei sehr vielen Tagfalter-Arten die ♀♀ breitere Flügel aufweisen, wodurch der Befund am Segelfalter an Bedeutung verliert.

Zusammenfassung

1. Die Augenflecken am Analwinkel der Hinterflügeoberseite sind bei *Iphiclides podalirius podalirius* (L.) und *Iphiclides podalirius feisthamelii* (Dup.) in der Größe verschieden. Bei *feisthamelii* sind sie um den Faktor ≈ 0.9 kleiner.

2. Bei beiden Unterarten sind diese Flecken in der gen. aest. gegenüber der gen. vern. um den Faktor ≈ 1.1 größer.

3. In der Variabilität der Augenfleckenkontur besteht zwischen *podalirius* und *feisthamelii* kein Unterschied. Sie ist eine Funktion der Faltergröße.

Danksagung

Mein Dank gilt zuerst meiner Ehefrau Paula Maria Wohlfahrt für ihre vielen erfolgreichen Sammelreisen im Mittelmeerraum. Für das mir leihweise aus der Zoologischen Staatssammlung München überlassene Faltermaterial aus N-Afrika danke ich Herrn Dr. W. Dierl; die Falter aus der SO-Türkei, Prov. Hakkari, wurden mir in dankenswerter Weise von Herrn J. J. de Freina, München, zur Verfügung gestellt. Für Ratschläge und Hilfe in statistischen Fragen danke ich Herrn Prof. Dr. H. Vogt, Institut für Angewandte Mathematik und Statistik der Universität Würzburg. Frau Dr. Elisabeth Wolf, Würzburg, bin ich für Diskussionen und Textkritik dankbar.

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Afrotropical records of the orthoclad genus *Mesosmittia* Brundin

(Insecta, Diptera, Chironomidae)

By **Ole A. Sæther**

Sæther, O. A. (1996): Afrotropical records of the orthoclad genus *Mesosmittia* Brundin (Insecta, Diptera, Chironomidae). – Spixiana **19/3:** 289-292

The male imago of *Mesosmittia cristaga*, spec. nov. is described from near the river Lushota in the West Usumbara Mts. in Tanzania. *Mesosmittia patrihortae* Sæther is reported from the Natal province of south Africa. One new combination, *Mesosmittia nigerrima* (Kieffer, 1918) is given. These are the first confirmed Afrotropical records of the genus.

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Introduction

The genus *Mesosmittia* Brundin containing seven Nearctic and one Palaearctic species recently was revised (Sæther 1985). The paper by Lehmann (1979) redescribing *Smittia nigra* Freeman, 1953 (= *Smittia subnigra* Freeman, 1956) as a *Mesosmittia*, however, was overlooked since Freeman & Cranston (1980) placed this species in *Pseudosmittia* Goetghebuer. *Camptocladius nigerrimus* Kieffer, 1918, placed by Freeman & Cranston (1980) in *Pseudoorthocladius*, clearly is a *Mesosmittia*. Two additional species are mentioned in Cranston et al. (1989) as described from China by Wang & Zheng. However, the latter paper was never published as both species turned out to be synonyms of *Mesosmittia patrihortae* Sæther. Almost nothing is known of the ecology of the genus. Although *M. flexuella* was stated to be terrestrial by Strenzke (1950), adults have been caught in emergence traps submerged in fast flowing streams (Cranston et al. 1989). The records in Sæther (1985) also indicates the genus as at least semiaquatic. The pupa of *Mesosmittia* is unknown, although the larva was described by Strenzke (1950).

During the expedition by the Museum of Zoology, University of Bergen, to Tanzania in 1990 several new genera and species of chironomids were collected together with a few genera new to the African continent. Among these was a new species of *Mesosmittia* Brundin. Dr. B. R. Stuckenberg, Natal Museum, South Africa, has sent me some intersting chironomids for examination. Also in this material a species of *Mesosmittia*, *M. patrihortae* was present.

Methods and terminology

The general terminology follows Sæther (1980). The holotype of *M. cristaga* is in the Museum of Zoology, University of Bergen, Norway.

Mesosmittia cristaga, spec. nov.

Figs 1, 2

Types. Holotype: ♂, Tanzania: West Usumbara Mts., Kibohelo, at Lushoto River, sweep net, 25.XI.1990, ZMB expedition 1990 (ZMB Type No. 234).

Diagnostic characters. The male imago can be separated from other members of the genus by having a very strong crista dorsalis making the gonostylus widest at apical third, 6 setae on squama, inferior volsella clearly widest at bluntly pointed projection, gonocoxite without apical or preapical projection, and an AR of about 1.5.

Description

Male imago (n = 1). Total length 2.24 mm. Wing length 1.27 mm. Total length/wing length 1.77. Wing length/length of profemur 2.87. Coloration blackish-brown.

Head. AR 1.46. Ultimate flagellomere 468 µm long. Temporal setae 7, including 2 weak inner verticals, 2 outer verticals, and 3 postorbitals. Clypeus with 8 setae. Tentorium (Fig. 1) 119 µm long, 23 µm wide. Stipes 117 µm long, 37 µm wide. Cibarial pump as in Fig. 1A. Palp segments lengths (in µm): 25, 53, 71, 69, 103.

Thorax. Antepronotum with 3 setae. Dorsocentrals 7; acrostichals about 10; prealars 5 with 2 in anterior, 3 in posterior group. Scutellum 6 setae.

Wing. VR 1.22. C extension 11 µm long. Brachiolum with 1 seta, other veins bare. Squama with 6 setae.

Legs. Spur of front tibia 49 µm long, spurs of middle tibia 23 µm and 18 µm long, of hind tibia 48 µm and 18 µm long. Width at apex of front tibia 31 µm, of middle tibia 27 µm, of hind tibia 42 µm. Comb with 10 setae, 22-39 µm long. Lengths (in µm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	441	608	270	144	99	72	63	0.44	3.49	3.88	2.8
p_2	504	531	203	117	90	–	–	0.38	–	5.11	3.1
p_3	531	617	347	171	144	81	59	0.56	3.29	3.31	7.1

Hypopygium (Fig. 2). Tergite IX with 13 setae, laterosternite with 2 setae. Phallapodeme 78 µm long, transverse sternapodeme about 82 µm long. Virga 53 µm long. Gonocoxite 146 µm long, inferior volsella well developed; distance along inner margin from apex of gonoxoite to apex of inferior volsella 41 µm; width of volsella including knob-like projection 24 µm, width without projection 15 µm. Gonostylus 85 µm long, 37 µm wide about 1/3 from apex, crista dorsalis strongly developed making gonostylus appear triangular, megaseta 5 µm long. HR 1.73, HV 2.64.

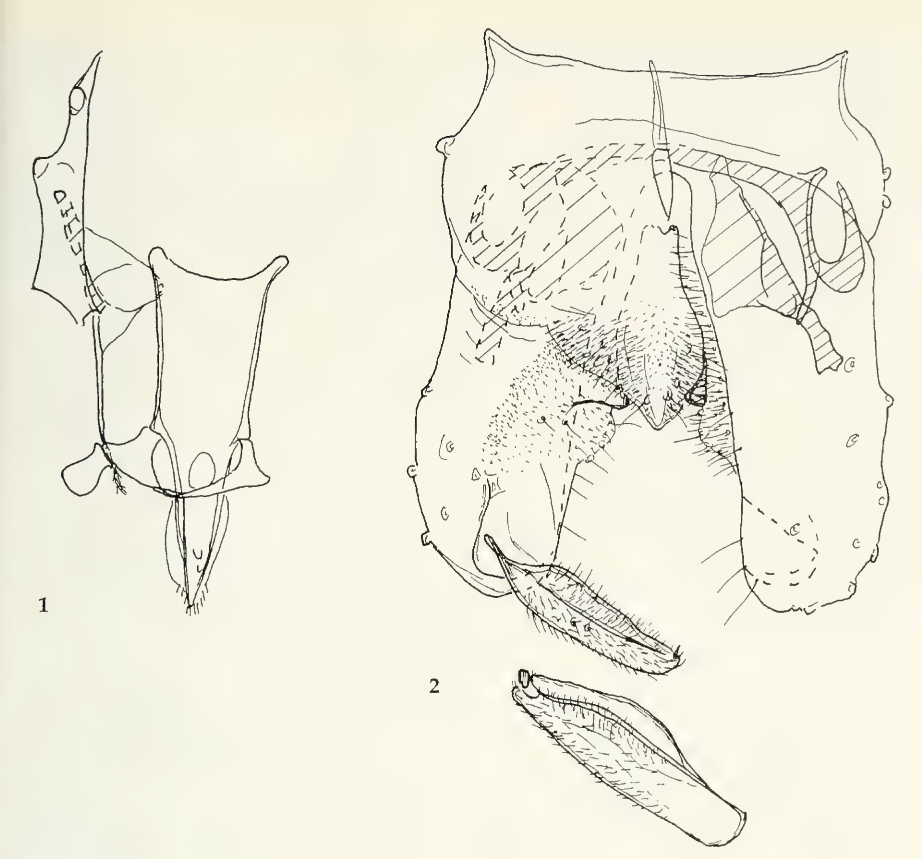
Etymology. From the Latin *crista*, crest, and the dismembered *magnus*, large, leaving *-gus* used as suffix, referring to the large crista dorsalis.

Systematic remarks. The new species will key to *M. patrihortae* in Sæther (1985) and undoubtedly is closely related to that species. It differs primarily in having a more strongly developed crista dorsalis. Other probably significant differences consist in the more numerous (6) setae on the squama, the much higher BR ratio of the hind leg (7.1 as opposed to 3.3-4.4), and the presence of only 2 setae on the laterosternite. *M. nigerrima* may be even more similar having a somewhat similar crista dorsalis which, however, makes the gonostylus wider in the middle and not in apical third. *M. nigerrima* has an AR of about 2.0 and 2-3 setae on squama.

Mesosmittia patrihortae Sæther

Mesosmittia patrihortae Sæther, 1985: 47.
Mesosmittia dolichoptera Wang & Zheng, 1990: 486, **syn. nov.**
Mesosmittia yunnanensis Wang & Zheng, 1990: 488, **syn. nov.**

New material examined: South Africa: Natal, Merrivale, near Howick, 29°31'S, 30°13'E, 1 ♂ at light, 13.-31.X.1990, B. R. Stuckenberg.



Figs 1, 2. *Mesosmittia cristagata,* spec. nov., male imago. 1. Cibarial pump, tentorium and stipes. 2. Hypopygium.

The measurements of the specimen from South Africa all are within the range of those of *M. patrihortae* as described in Sæther (1985: 47) except that the costal extension is 46 µm long with an indication of a false vein at apex of the costa extending to 126 µm, there is a non-marginal seta at the apex of the costal extension, the ultimate flagellomere is 513 µm long, the antennal ratio is 1.51, the HV is 2.74, and some of the leg segments are very slightly longer. If the longer costal extension hold up on a larger material the specimen may be shown to belong to a separate species or subspecies.

M. patrihortae is widespread in North America and I have seen several specimens from China in the collection of Xinhua Wang, Department of Biology, Nankai University, Tianjin, China, determined as *M. dolichoptera* Wang & Zheng and *M. yunnanensis* Wang & Zheng. Most likely some of the European records of *M. flexuella* (Edwards) (Ashe & Cranston 1990) concerns *M. patrihortae* and not *M. flexuella.*

Mesosmittia nigerrima (Kieffer), comb. nov.

Camptocladius nigerrimus Kieffer, 1918: 81.
Orthocladius nigerrimus, Freeman 1956: 335.
Pseudorthocladius nigerrimus, Freeman & Cranston 1980: 185.

The description by Freeman (1956: 335, Figs 9i-j) is sufficient to place this species as member of *Mesosmittia* close to *M. acutistylus* Sæther, 1985 and *M. cristaga,* spec. nov.

Smittia nigra Freeman

Smittia nigra Freeman, 1953: 206.
Smittia subnigra Freeman, 1956: 352.
Pseudosmittia subnigra, Freeman & Cranston 1980: 186.
? *Mesosmittia subnigra*, Lehmann 1979: 41.
not *Allocladius niger* Kieffer, 1913: 28 [= *Pseudosmittia nigra* (Kieffer)].
not *Smittia nigra* (Kieffer), Freeman 1956: 349 [= *Pseudosmittia nigra* (Kieffer) and *Pseudosmittia salti* Freeman, 1954].

The type material of *Smittia nigra* Freeman, *Pseudosmittia salti*, and *Pseudosmittia nigra* (Kieffer) at The Natural History Museum, London, and Museum National d'Histoire Naturelle, Paris, were re-examined in connection with an on-going revision of the genus *Pseudosmittia*.

The male holotype appears to be an atypical *Smittia* in lacking the characteristic long anal point, but has short acrostichals starting in front at scutum. It may conceivably represent an undescribed genus. The female paratype is a typical *Smittia*.

The specimen described by Lehmann (1979) probably is a different species belonging neither to *Smittia* nor to *Mesosmittia*, since there is just 1 median acrostichal, no setae on squama, and the gonostylus appear quite different from known species of *Mesosmittia*.

Acknowledgements

I am indebted to B. R. Stuckenberg, Section of Entomology, Natal Museum, Pietermaritzburg, South Africa, for the specimen of *M. patrihortae*.

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Janolus rebeccae, a new species of arminacean nudibranchs from northern Chile

(Gastropoda, Nudibranchia, Zephyrinidae)

By **Michael Schrödl**

Schrödl, M. (1996): *Janolus rebeccae*, a new species of arminacean nudibranchs from northern Chile (Gastropoda, Nudibranchia, Zephyrinidae). – Spixiana **19/3:** 293-300

The specimens previously reported from northern Chile as "*Janolus* sp. 1" by Schrödl (1996), in this study are described anatomically and histologically, and briefly compared with other known species of the genus *Janolus* Bergh, 1884. The species studied comes closest to the Californian *J. barbarensis* (Cooper, 1863). Due to several external, digestive and reproductive features differing in details from those of *J. barbarensis*, the Chilean species is considered to be new; it is described under the name *Janolus rebeccae*, spec. nov.

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Introduction

The genus *Janolus* Bergh, 1884 comprises a group of remarkable nudibranchs: Externally the relatively large individuals are characterized by the presence of numerous elongated dorsal appendages (cerata) which are often brightly coloured, giving them an aeolidacean-like appearance. However, the presence of an undulating crest (caruncle) between the perfoliated rhinophores distinguishes all *Janolus* species externally from aeolidacean nudibranchs.

Revising the South African Janolidae, Gosliner (1981) fused the genus *Antiopella* Hoyle, 1902 with the senior *Janolus*, described *J. longidentus* Gosliner, 1981 and compared the species belonging to *Janolus* known at that time. Subsequently, Gosliner (1982) redescribed the Californian *J. barbarensis* (Cooper, 1863) and reinstated *J. fuscus* O'Donoghue, 1924, which previously often had been confused with the former species. In a comprehensive account on New Zealand arminaceans Miller & Willan (1986) suggested that the family group name Zephyrinidae Iredayle & O'Donoghue, 1923 should replace the also commonly used junior synonym Janolidae Pruvot-Fol, 1954. They redescribed in detail the poorly known *J. novozealandicus* (Eliot, 1907) and showed that *J. flagellatus* Eliot, 1906 is conspecific with *J. hyalinus* (Alder & Hancock, 1854). *Bonisa nakaza* Gosliner, 1981 was considered to belong to *Janolus*, synonymizing the monotypic genus *Bonisa* Gosliner, 1981 with the senior *Janolus*. Together with three new species described by Miller and Willan (1986) the genus *Janolus* is comprised of 18 species distributed worldwide within temperate and warmer waters. However, from the southeastern Pacific just recently a single species ("*Janolus* sp. 1") has been reported and briefly described externally (Schrödl 1996). In the present study, this Chilean species is described anatomically and compared with other species of the genus *Janolus*.



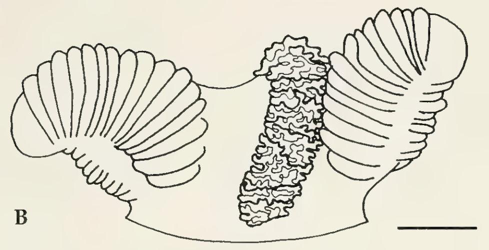


Fig. 1. *Janolus rebeccae*, external features. A. Dorsal view of the living holotype. Scale bar: 5 mm. B. Rhinophores and caruncle of the preserved paratype. Scale bar: 0.5 mm.

Methods

All specimens have been collected using SCUBA. After observing the specimens in situ and in aquaria they were narcotized with a 10 % $MgCl_2$ solution and preserved in 70 % ethanol. All specimens were partly dissected macroscopically. Some cerata, the rhinophores together with the caruncle, and parts of the genital system were removed from the paratype, postfixed with formalin and embedded in Hydroxyethylmethacrylate for serial sectioning. The 2.5 µm sections were stained with toluidine blue and histologically examined. SEM examinations of jaws and radulae were made using a Philipps XL 20 Scanning Electron Microscope.

Janolus rebeccae, spec. nov.

Types. Holotype: 1 dissected specimen collected by M. Schrödl on 16 March 1994; Bahía Inglesa (27°07'S, 70°53'W), at 3 m depth, on *Bugula flabellata* (Thompson)(Zoologische Staatssammlung München ZSM, No. 19960557). - Paratype: 1 dissected specimen, collected by M. Schrödl together with the holotype (Museo Zoológico de la Universidad de Concepción, Chile, No. 24048). - Additional material: 1 juvenile specimen, dissected, collected by M. Schrödl on 26 February 1994, Juan López (23°30'S, 70°32'W), at 12 m depth, on algae.

Tab. 1. *Janolus rebeccae*, body dimensions, jaw and radular characters of specimens examined.

Specimen No.	Body length (mm) (alive/preserved)	No. of jaw denticles	Radula formula (No. of rows × No. of teeth per row)
1 (holotype)	43/23	10-12	26 × 30.1.30
2 (paratype)	20/ 8	10-11	20 × 26.1.26
3	12/ 5	10-11	22 × 25.1.25

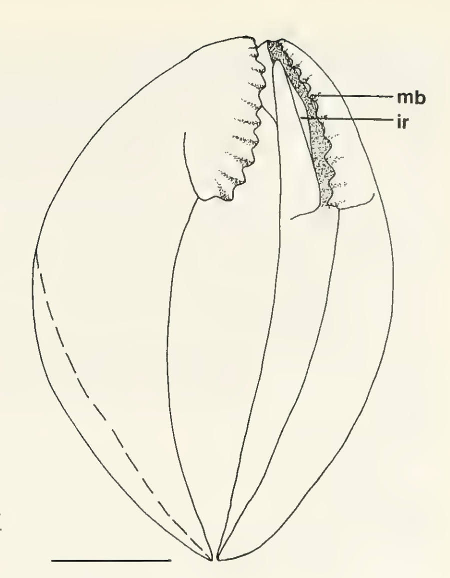


Fig. 2. *Janolus rebeccae,* specimen No. 3. Drawing of the jaws. Note denticulate masticatory border (mb) and smooth inner ridge (ir). Scale bar: 0.5 mm.

Description

External morphology. The crawling holotype reached 43 mm in length. Body dimensions are given in tab. 1. Body shape elongate, anterior border of head rounded. Numerous cerata present all around the notal margin and arranged in irregular transverse rows. Middorsal region and tail do not bear cerata. Cerata smooth, longish, considerably inflated and bear an elongated slender tip. Generally cerata length increases from margin towards centre, the innermost cerata being the longest ones. However, the holotype bears several very small inner cerata, which may substitute lost longer ones. Diverticles of the digestive gland project into all cerata, begin to branch irregularily one to several times within the first half of the cerata, and nearly reach their tips. The cerata may be easily autotomized by the specimens during rough handling.

Rhinophores large and perfoliated. Only the most basal parts smooth; these cannot be distinctively separated from the notum. Between the rhinophores a median ondulating crest, the caruncle (Fig. 1B). The head bears two short oral tentacles lateral to mouth opening. Anteriorly the foot is deeply grooved into two lips, laterally the foot corners protrude considerably. Upper lip notched in middle and connected with the tissue surrounding the mouth opening. Anus situated far posteriorly, slightly to the right of middorsal line. Gonopores open laterally just below notum, slightly in anterior half of the preserved holotype.

Colour. Body as well as caruncle translucent. Tail with median opaque white line, on notum some scattered opaque white dots may be present. Cerata with a subapical golden brown ring and white tips. Rhinophores also have white tips above a subapical light blue marking. The dark brown content of the digestive glands' branches visible through the notum and within the cerata. Also the whitish anal gland shines through the notum.

Digestive system. A ring of small subepidermal mouth glands present. There is a pair of strong, cuticularized jaws; the masticatory borders of the two smaller specimens (No.'s 2 and 3) bear 10 to 11 denticles each; the damaged masticatory borders of the holotype may bear 10-12 denticles. Posterior to the denticulate masticatory border is a second, less elevated and smooth ridge (Fig. 2).

Radulae with up to 26 rows (Tab. 1). Rhachidian teeth hook shaped; a slender basal plate bears a more or less elongated, rather broad and blunt median cusp without lateral denticulation (Fig. 3). Lateral teeth simply hook shaped without denticles, they increase in size towards middle of half row; the outermost teeth small.

A pair of flat dendritic salivary glands lie adjacent to the roomy, transversely extending stomach. As described for *J. capensis* by Gosliner (1981), in the present material there are three major branches of the



Fig. 3. *Janolus rebeccae*, SEM photograph of rhachidian and inner lateral radular teeth of the holotype. Scale bar: 0.01 mm. Abbreviations: r: rhachidian tooth, l: first lateral tooth.

digestive gland leaving the stomach; the first leaves the stomach anteriorly to the left entering the anterior left cerata, the second inserts the stomach on the left side and runs to the posterior left and right cerata. The third branch leaves the stomach laterally on the right side and its diverticles insert into the anterior right cerata. Macroscopically, the terminal regions of the diverticles do not appear to differ from the usual digestive gland structure. The stained sections show that the apices of the diverticles are characterized by an accumulation of large, optically empty cells, whereas further basally there are smaller digestive gland cells which are filled with blue staining granules (Fig. 6). The intestine extends far posteriorly and opens through an elevated anal papilla. A large anal gland surrounds the anus.

Reproductive system. Generally the reproductive organs of all three specimens are very similar in shape, with exception of the smaller size of the female gland mass of the small, not fully developed specimen (No. 3). Figure 4 gives an outline of the reproductive organs of specimen No. 2. In all specimens the hermaphroditic duct inserts into a spherical ampulla. Nearly opposite to the insertion the distal gonoduct leaves the ampulla, but bifurcates readily into a thick vas deferens and a thinner oviduct. After a few convolutions the vas deferens passes into a thick and conical penial papilla which is covered by the muscular wall of the male atrium. The penial papilla is not armed by a cuticle.

Distally the thin proximal oviduct becomes considerably thicker and bulbous. In specimens No. 2 and 3 this bulbous oviduct portion is additionally curved, forming a knobby organ, just before the insertion of the stalked, elongate receptaculum seminis. The female glands insert distally at the oviduct next to the female aperture. No separate bursa copulatrix was detected. This genital system represents an androdiaulic condition type II according to Schmekel (1970).

The following histological results refer to the serially sectioned genital system of the paratype: The ampulla is filled with autosperms. The vas deferens is prostatic throughout its length. The vas deferens wall consists of an inner layer of glandular cells containing large, unstained vesicles which is surrounded by an outer muscular layer. Distally the thin proximal oviduct becomes wider and longitudinally folded. Within this externally bulbous portion, the inner structure resembles that of the stalked receptaculum seminis: The inner epithelium is strongly folded, bears dense and long cilia and is covered by well developed muscular layers. Distally from the insertion of the stalked receptaculum seminis the inner structure of the oviduct changes. Its wall becomes less folded, the epithelial cells bear

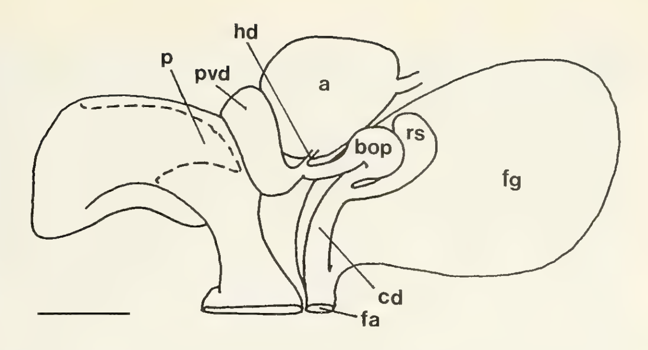


Fig. 4. *Janolus rebeccae*, outline of the genital system of the paratype. Scale bar: 0.5 mm. Abbreviations: a: ampulla; bop: bulbous oviduct portion; cd: oviduct; fa: female aperture; fg: female glands; hd: hermaphroditic duct; p: penial papilla; pvd: prostatic vas deferens; rs: receptaculum seminis.

much shorter cilia and there are fewer muscles. As this portion of the oviduct do not show the thin walled and glandular structure of a usual doridacean bursa copulatrix, a gametolytic function is not likely. The female gland complex and the distal vagina could not be examined histologically due to damage during previous macroscopical examination.

Central nervous system. In the holotype the cerebral ganglia are completely fused with the pleural ganglia (Fig. 5), in specimen No. 2 a superficial notch is still visible. The buccal ganglia are well separated from each other. Anteriorly each cerebral ganglion may bear two nerves inserting very close together, or only one nerv which bifurcates basally; the outer branches insert into the rhinophoral ganglia which are situated basally within the rhinophores, both inner branches innervate the caruncle. Due to the cerebral innervation from both sides (Fig. 5) and to histological results showing a similar, ciliary structure of the rhinophoral and caruncle tissue (Fig. 7), the caruncle of *J. rebeccae* probably is a paired, fused sensory organ, which may be a descendent of the janolid rhinophores. The eye nerves of the holotype are long, those of specimen No. 2 are somewhat shorter; basally there are distinct optical ganglia. A statocyst with several otoconia nestles between pedal and cerebropleural ganglia.

Ecology and distribution. All three specimens were found in the rocky upper subtidal between 3 and 12 m depth during February to March 1994. Two specimens from Bahía Inglesa were observed in situ and later in the aquarium to feed on the arborescent bryozoan *Bugula flabellata* (Thompson). The known geographical distribution of *Janolus rebeccae* ranges from Bahía Inglesa (27°07'S, 70°53'W) north to Juan López (23°30'S, 70°32'W) (Schrödl 1996).

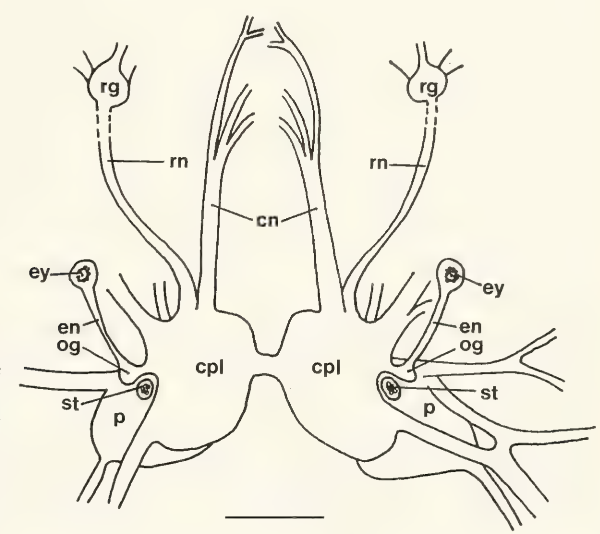


Fig. 5. *Janolus rebeccae*, central nervous system of the holotype. Ventral parts of the central nervous system and esophagus are omitted. Scale bar: 0.5 mm. Abbreviations: cn: caruncle nerves; cpl: fused cerebropleural ganglia; ey: eyes; en: eye nerves; og: optical ganglia; p: pedal ganglia; rg: rhinophoral ganglia; rn: rhinophoral nerves; st: statocyst.

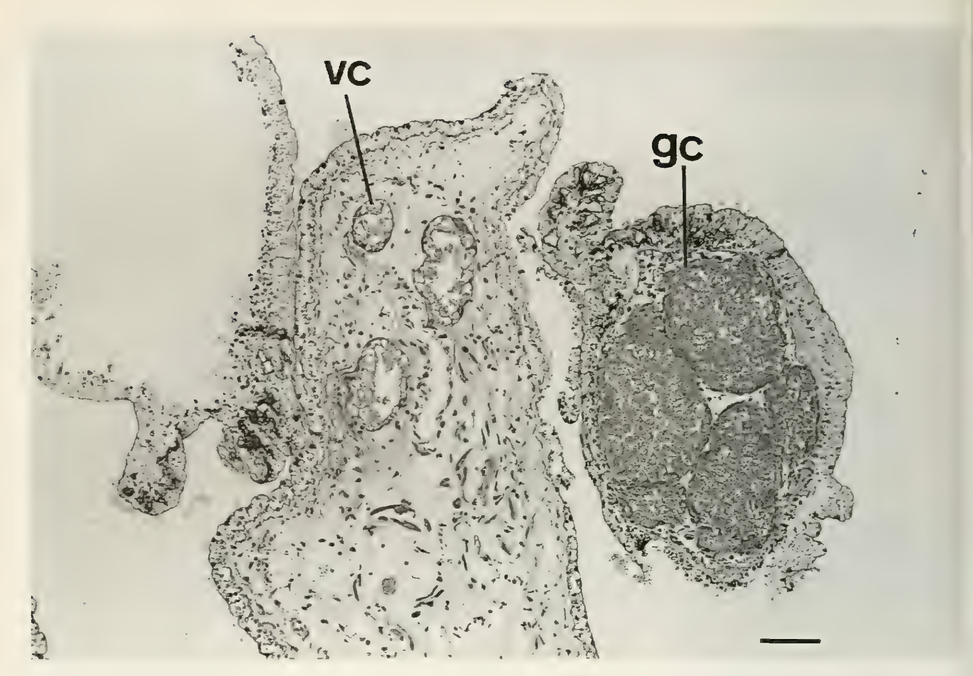


Fig. 6. *Janolus rebeccae*, paratype. Histological section of cerata containing digestive gland diverticles. Terminal portion of diverticles containing predominately large vacuolized epithelial cells (vc). More basal portion mainly with smaller, grana containing cells (gc). Scale bar: 0.1 mm.

Discussion

Despite their different sizes, the specimens described above are rather uniform regarding colour pattern, body shape and internal features; the smallest individual is an exception in that it has a still poorly developed female gland mass. In consequence, there is no doubt that they are conspecific. Due to external features like general body shape, possession of cerata and caruncle, they can be assigned to the genus *Janolus*. Within this genus, species can be divided into two groups: (1) Eight species having denticulate mandibules formerly assigned to a separate genus *Antiopella*. *J. novozealandicus* Eliot, 1906 which originally was reported to have an irregular denticulation on its masticatory jaw edge (Eliot 1906) was redescribed as having a smooth edge (Miller & Willan 1986). (2) Species lacking any jaw denticles (10 species including *J. novozealandicus*). Since the Chilean species studied here has well developed jaw denticles (Fig. 2) it has to be compared taxonomically with the species belonging to the first group: According to Gosliner (1981, 1982) the northeastern Pacific *J. fuscus* has unbranched ceratal ducts whereas these are branched in the present species. *J. longidentatus* from South Africa differs due to its denticulate rhachidian teeth (Gosliner 1981) from the present species with its smooth rhachidians. Marcus (1958) described a Brasilian species, *J. mucloc* Marcus, 1958, as having a triaulic genital system. The same condition was mentioned for the Japanese *J. toyamensis* Baba and Abe, 1970 by Gosliner (1981), which clearly separates both these species from the diaulic Chilean species. The latter mainly agrees with the European *J. cristatus* (Delle Chiaje, 1841) regarding mandibular and reproductive features even if a small distal allosperm vesicle mentioned for *J. cristatus* could not be detected in the material examined. However, *J. cristatus* described and figured by Schmekel & Portmann (1984) is distinct from the Chilean species due to colour pattern and digestive diverticula which branch at the ceratal apices in *J. cristatus* and not already in the basal half of the cerata as in the Chilean species. The latter possesses a stalked receptaculum seminis, together with an additional receptacle-like bulbous oviduct, whereas the Californian *J. barbarensis* has a single serial receptaculum seminis (Gosliner 1982).

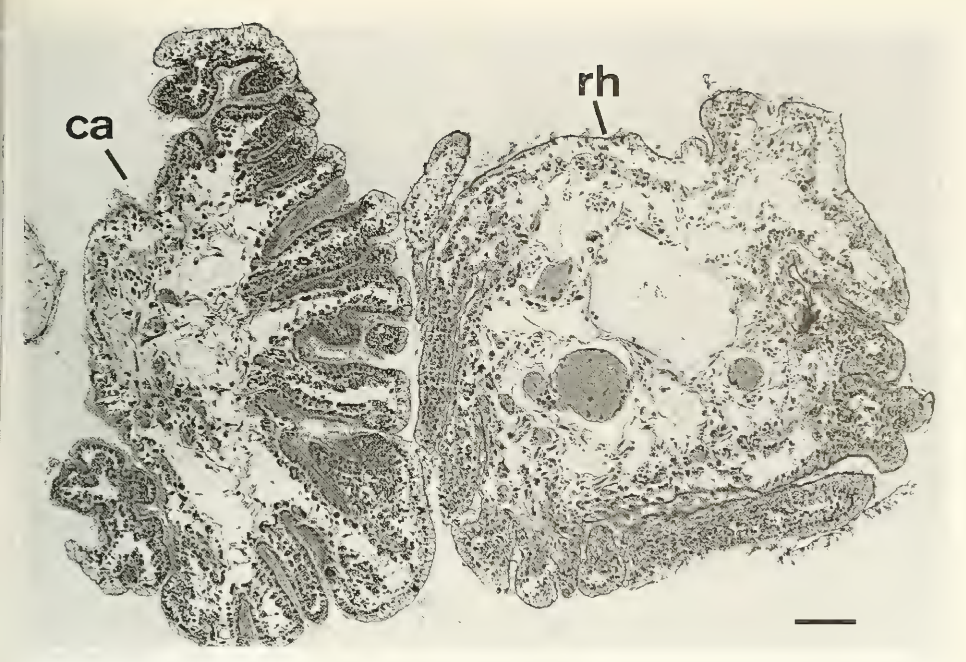


Fig. 7. *Janolus rebeccae*, paratype. Histological section of rhinophores (rh) and caruncle (ca) showing their similar structure. Scale bar: 0.1 mm.

J. indicus (Eliot, 1909) and the Atlantic *J. praeclarus* Bouchet, 1975 are incompletely described. Due to their body colouration which is translucent with red-brown spots (Eliot 1909) and orange with opaque white (Bouchet 1975), respectively, they differ from the here described species which has a translucent body with only few white spots on the notum.

In its external appearance the Chilean species most resembles the Californian species *J. barbarensis* as it has been redescribed by Gosliner (1982) and pictured in Behrens' (1991) guide to "Pacific Coast Nudibranchs". Previous descriptions of *J. barbarensis*, e.g. by MacFarland (1966), have been shown to confuse data from both Californian species, *J. barbarensis* and *J. fuscus* by Gosliner (1982), and therefore they are not used for the following comparision: Within the Chilean material the rhinophores lack the lemon yellowish colouration described for *J. barbarensis*, and, as well as the cerata, they have white tips, instead of the light to dark blue tips in *J. barbarensis*. The caruncle is transparent, not orange as in *J. barbarensis*. A median white line is exclusively present on the tails of the Chilean specimens. The brownish branchings of the digestive glands are visible through the notum dorsally and within the cerata; in *J. barbarensis* the ducts of the digestive glands are only visible within the cerata, but not through the notum.

The Chilean species, even the smallest individual, possesses more mandibular denticles than *J. barbarensis* (10-12 vs. 7-9). Posteriorly to the denticulate masticatory border there is a second, smooth but clearly elevated ridge (Fig. 2) which is not mentioned to be present in *J. barbarensis*. The rhachidian teeth of the Chilean species are hook-shaped without bearing denticles, and have a slender base. The lateral teeth do not possess denticles. In contrast, *J. barbarensis* has rhachidians with a broad base and inner laterals which Gosliner (1982) described to possess up to six irregular denticles.

In the Chilean specimens the cerebropleural ganglia may be completely fused (holotype), or superficially notched (paratype) as it was described for *J. barbarensis*. Also the length of the optical nerves varies within the Chilean material studied: The holotype has optical nerves nearly as long as drawn for *J. longidentatus* by Gosliner (1981), whereas they are only about half as long in the paratype. Gosliner (1982) described *J. barbarensis* as having "much shorter" optical nerves than *J. longidentatus*. Regarding

reproductive characters there are several differences: The ampulla is saccate or slightly convoluted in *J. barbarensis* but rounded in the Chilean species. Both species possess a large and thick glans penis and an externally similar, thick and rather short vas deferens. This duct is described to be muscular and not prostatic in *J. barbarensis* by Gosliner (1982), but is prostatic throughout in the Chilean species, possessing just a superficial muscular layer. As mentioned above, the most conspicious difference between the Chilean species and *J. barbarensis* appears to be the presence and position of the allosperm vesicles within the female genital system: The former possesses a stalked longish receptaculum seminis and, additionally, has a bulbous oviduct portion which, due to its similar structure, possibly also serves as an allosperm receptacle; the distal oviduct has no gametolytic function, a separate bursa copulatrix could not be detected. In contrast, *J. barbarensis* is described to have a large rounded bursa copulatrix entering the female vestibule opposite to the oviduct insertion; the receptaculum seminis is serial. According to Gosliner (1982), the vagina may or may not bear a thin additional duct which separately enters into the receptaculum seminis. This structure variability, as well as the low number of examined specimens of both, *J. barbarensis* and the Chilean species, are reasons against stressing these apparentely clear genital differences for a specific separation. Technical problems dissecting the compact female organs may lead to misinterpretations, and it is difficult to judge on the prostatic (or not prostatic) character of the vas deferens without a histological examination. However, additionally considering the numerous external, mandibular and radular differences, a specific separation between the Californian and the Chilean species appears to be indicated. Thus, in the present study, the Chilean species is established as a new species.

Acknowledgements

I would like to thank my friends Manfred Wurzer and Klaus Salger for their diving company and kind assistance in the field. My gratetude is also directed to professor H. Moyano, Universidad de Concepción, Chile, who identified the bryozoan food of *J. rebeccae*. Dra. Casanueva, Universidad de Concepción, is particularily acknowledged for her efforts in publishing a previous study which contains the first colour photographs of *J. rebeccae* and many other Chilean nudibranchs. Special thanks go to Heike Wägele for exciting discussions as well as for using her taxonomical data base funded by the Deutsche Forschungsgemeinschaft, and to Theresa Saks for her language corrections.

The name of the new species acknowledges the constant help and understanding of the author's wife Rebecca Schrödl as well as her instinctive feeling that this beautiful species may be new.

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SPIXIANA	**19**	3	301–302	München, 01. November 1996	ISSN 0341–8391

Description of a new buccinid species from Vietnam

(Mollusca, Gastropoda, Buccinidae)

Von **Manfred Parth**

Parth, M. (1996): Description of a new buccinid species from Vietnam (Mollusca, Gastropoda, Buccinidae). – Spixiana **19/3:** 301-302

Siphonalia marybethi, spec. nov. from Vietnam is described and compared with *Siphonalia fusoides* (Reeve, 1846).

Manfred Parth, Erzgießereistraße 18c, D-80335 München, Germany.

Introduction

A new species of the genus *Siphonalia* Adams, 1853 is described on the basis of two specimen trawled by local fishing boats off-shore Vung Tau in Vietnamese waters.

Siphonalia marybethi, spec. nov.
Abb. 1, 2

Types. Holotype: 48.8 × 26.7 mm, trawled off-shore Vung Tau/Vietnam (Zoologische Staatssammlung München, No. 1996 485). - Paratype: 43.7 × 22.0 mm, trawled off-shore Vung Tau/Vietnam (Collection Parth).

Description

Shell solid, medium sized for the genus. Protoconch broken in holotype and paratype, teleoconch with 5.5-6 rounded and inflated whorls. On first 4 whorls strong axial sculpture with 10-12 riblets per whorl. Weak sculpture on body whorl. Strong spiral sculpture with 7 narrow, deeply grooved spiral cords on penultimate whorl, 18 spiral cords on last whorl, the first cord near the suture being the strongest. Inner lip of aperture very weakly callused, outer lip strongly ribbed inside. Anal canal deep and broad, siphonal canal slightly recurved, open, short. Colour of shell cream-yellow, with brown shadows on weak axial sculpture on last two whorls on holotype (paratype is completely pale).

Derivatio nominis: The new species is dedicated to Mrs. Marybeth Ortuyo Sonner, Munich.

Remarks. Because of its strong and deeply grooved spiral cords and its broader shape *Siphonalia marybethi* can easily be distinguisehd from *Siphonalia fusoides* (Reeve,1846), the single species of the genus with which is could be confused.



Abb. 1, 2. *Siphonalia marybethi*, spec. nov. Holotype. 1. Ventral view. 2. Dorsal view.

SPIXIANA	19	3	303–304	München, 01. November 1996	ISSN 0341–8391

Beschreibung einer neuen Ranellide aus dem Indo-Pazifik

(Mollusca, Gastropoda, Ranellidae)

Von **Manfred Parth**

Parth, M. (1996): Description of a new ranellid species from the Indo-Pacific (Mollusca, Gastropoda, Ranellidae). – Spixiana **19/3:** 303-304

Linatella (Gelagna) pallida, spec. nov. from the Indo-Pacific is described and compared with *Linatella (Gelagna) succincta* (Linné, 1771).

Manfred Parth, Erzgießereistraße 18c, D-80335 München, Germany.

Seit über zehn Jahren befinden sich Exemplare einer Ranelliden-Art in meiner Sammlung, die ich bisher unter Vorbehalt zur Art *Linatella (Gelagna) succincta* zählte. Diese Exemplare unterscheiden sich, von der kleineren Durchschnittsgröße abgesehen, von typischen *L. succincta* im wesentlichen in drei Merkmalen:

a) kürzeres Gewinde als *L. succincta*,
b) Windungen bauchiger und rundlicher,
c) Gehäuse blasser und Spiralreifen ohne die markante dunkle Färbung von *L. succincta.*

Ich war mir zunächst nicht im klaren, ob es sich bei den »blasseren« Exemplaren lediglich um eine Extremform von *L. succincta* handelt, oder ob sie tatsächlich eine neue Art darstellen. Aber es gelang mir nie, *L. succincta* und die "blassere" Form vom gleichen Fundort zu bekommen, was ja ein wesentliches Indiz für das Vorhandensein von zwei distinkten Arten wäre. Dies ist nun geschehen, im Süden Madagaskar (Fort Dauphin) kommen die beiden Formen sympatrisch vor, so daß nach meinem Dafürhalten eine Beschreibung der helleren Form als neue Art berechtigt ist.

Linatella (Gelagna) pallida, spec. nov.

Abb. 2

Typen. Holotypus: 42.9 × 26.1 mm, gedredscht aus tieferen Gewässern nördlich von Mogadishu, Somalia (Zoologische Staatssammlung München, Nr. 1996 484). – Paratypen: 3 Exemplare: 1: 48.1 × 30.5 mm, Mogadishu, Somalia; 2: 36.2 × 22.7 mm, Fort Dauphin, Madagaskar; 3: 31.8 × 19.9 mm, Tulear, Madagaskar (Coll. Parth).

Beschreibung

Gehäuse für die Gattung klein, mit kurzem Gewinde, Höhe der Spira 1/3 der gesamten Gehäuselänge. 4 1/2 Teleoconch-Umgänge, die Umgänge von sehr runder und bauchiger Struktur. Auf den ersten Umgängen ca. 6-7 Spiralreifen sichtbar. Auf letztem Umgang 17-20 kräftige Spiralreifen, in den relativ breiten Furchen dazwischen keine weitere Skulptur erkennbar. Äußerst geringe und sehr feine Radialskulptur. Mündung eiförmig, Innenlippe glatt, Außenlippe mit bis zu 13 dunkelbraun gefärbten Zahnleisten. Ein kräftiger kleiner Farbfleck auch am äußersten oberen Rand der Innenlippe sichtbar. Gut ausgebildete, hohe Mündungsvarix. Siphonalkanal sehr lang, leicht nach außen gebogen. Gehäusefärbung hell cremefarben bis braun, ohne jegliche Färbung der Spiralreifen. Operkulum unbekannt.

Derivatio nominis. Der Name bezieht sich auf die viel heller Färbung im Vergleich zu *Linatella succincta.*

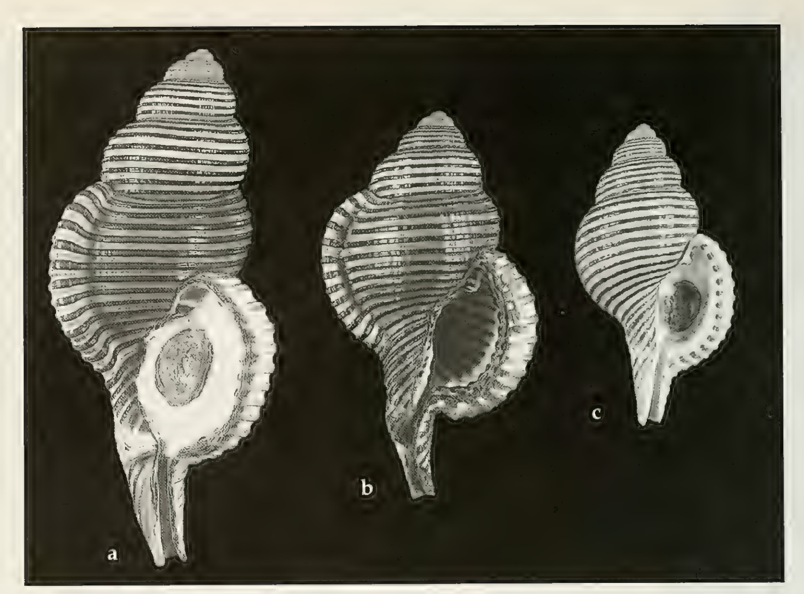


Abb. 1. a. *Linatella succincta*, Tawi Tawi/Philippinen, 101.1 mm. b. *Linatella succincta*, Cebu/Philippinen, 76.7 mm. c. *Linatella succincta*, Cebu/Philippinen, 60.5 mm.

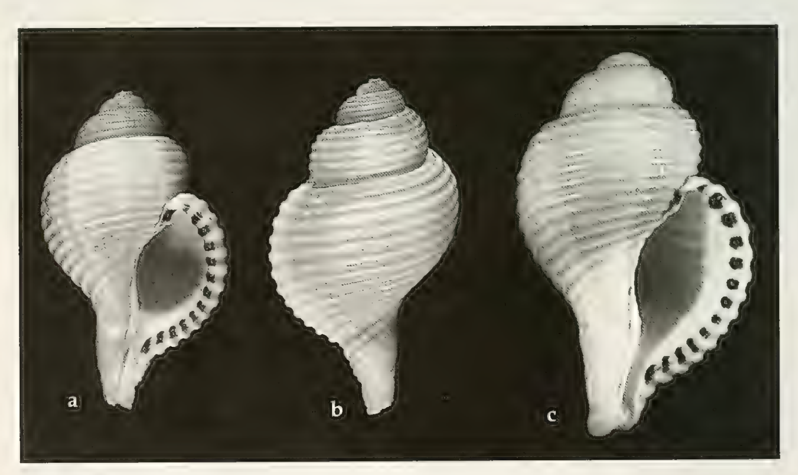


Abb. 2. *Linatella pallida*, spec. nov. Holotypus, 42.9 mm. a. Ventral view. b. Dorsal view. c. Paratypus 1, 48.1 mm.

Verbreitung. Die neue Art ist bislang außer von den genannten Fundorten nur von Oman (Beu 1986, S. 259, Abb. 30, 31) bekannt, wogegen *Linatella (Gelagna) succincta* (Linné 1771) vom roten Meer bis Hawaii verbreitet ist und von Bernard (1981) auch zum ersten Mal von der Westküste Afrikas (Port Gentil/Gabon) gemeldet wurde.

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SPIXIANA	19	3	305–306	München, 01. November 1996	ISSN 0341–8391

A new species of *Hadroocorys* Quinn, 1980 from northern Sri Lanka

(Mollusca, Gastropoda, Cassidae)

By **Kurt Kreipl & Heinrich Mühlhäusser**

Kreipl, K. & H. Mühlhäusser (1996): A new species of *Hadroocorys* Quinn, 1980 from northern Sri Lanka (Mollusca, Gastropoda, Cassidae). – Spixiana **19/3:** 305-306

Hadroocorys dorae, spec. nov. is described and compared with the other known species of the genus *Hadroocorys*: *Hadroocorys verrilli* (Dall, 1889) from the Lesser Antilles and *Hadroocorys tosaensis* (Habe & Azuma 1959) from Japan.

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Heinrich Mühlhäusser, Dreikönigstraße 18, D-79102 Freiburg, Germany.

Introduction

The genus *Hadroocorys* was created by Quinn (1980) for two species of the Oocorythidae (*O. verrilli* and *O. tosaensis*) with thick, heavy shells, a varicose and strongly denticulate outer lip, and a colemellar lip with heavy, strongly ridged callus. A third species of this genus is described herein.

Hadroocorys dorae, spec.nov.

Figs 1, 2

Types. Holotype: 42.8 mm × 27.8 mm, Palk Strait, northern Sri Lanka (Zoologische Staatssammlung München, eing. Kat. Nr. 1996 483) – Paratype 1: 46.9 mm × 31.4 mm, same locality (Coll. Kreipl, Öhringen-Cappel); Paratype 2: 47 mm × 29.9 mm, same locality (Coll. Mühlhäusser, Freiburg).

Type locality: Palk Strait, northern Sri Lanka, in a depth of about 120 m.

Description of holotype

Height: 42.8 mm, width: 27.8 mm; protoconch small and smooth, consisting of 2 ½ whorls; shell very solid and heavy, ovate with 5 whorls on teleoconch; spire moderately high and body whorl large with 27 spiral cords crossed by numerous fine growth lines which gives the surface a slightly reticulate appearance; aperture elongate and rather narrow, constricted near the posterior end; outer lip very much thickened, inner side of outer lip with 24 very strong, elongate teeth which run inwardly a short distance from the edge; parietal lip with heavy callus marked by strong ridges and elongate pustules; siphonal canal very short. Colour chalky white.

Description of paratype 1

Height: 46.9 mm, width: 31.4 mm; spiral cords and growth lines a little more prominent than in holotype; teleochonch consisting of 6 whorls. Colour creamy white.

Etymology. We dedicate this new species to Miss Dora Jaegle, Öhringen.



Figs 1, 2. *Hadroocorys dorae*, spec. nov. Holotype. 1. Ventral view. 2. Dorsal view.

Discussion

Hadroocorys dorae, spec.nov. differs from both other known species of the genus, *H. verrilli* (Dall, 1889) and *H. tosaensis* (Habe & Azuma, 1959), by larger size (33 mm in *verrilli* and 32 mm in *tosaensis*), higher spire, more numerous spiral cords on the body whorl (19 in *verrilli* and 23 in *tosaensis*), and lack of a canaliculate suture.

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SPIXIANA	19	3	307–314	München, 01. November 1996	ISSN 0341-8391

Revision der Callichrominengattung *Agaleptus* mit Beschreibung von drei neuen Arten

(Insecta, Coleoptera, Cerambycidae)

Von **Karl Adlbauer**

Adlbauer, K. (1996): Revision der Callichrominengattung *Agaleptus* mit Beschreibung von drei neuen Arten (Insecta, Coleoptera, Cerambycidae). – Spixiana **19/3:** 307-314

The genus *Agaleptus* Gahan, 1904 is revised and 3 species from Tanzania and Zimbabwe are described as new to science: *A. zimbabweanus*, spec. nov., *A. tanzanicus*, spec. nov. and *A. wallabergeri*, spec. nov. For *Agaleptus quadrinotatus* (Peringuey, 1888) the first records from Somalia and Kenya are presented.

Dr. Karl Adlbauer, Landesmuseum Joanneum, Zoologie, Raubergasse 10, A-8010 Graz, Österreich.

Einleitung

Die Gattung *Agaleptus* wurde von Gahan (1904) beschrieben, Typusart ist der von Peringuey (1888) beschriebene *Closteromerus (Helymaeus) quadrinotatus*. Schmidt (1922) fügte anläßlich seiner Revision der afrikanischen Callichromini die beiden von ihm neu beschriebenen Taxa *A. quadrinotatus* ssp. *maculatus* und *A. guttatus* dieser Gattung hinzu, schließlich beschrieb Fuchs (1961) noch *A. fulvipennis* – mehr Taxa sind bisher nicht bekannt geworden.

Die Gattung ist über Ost- und Südafrika verbreitet, eine Art (*A. fulvipennis*) wurde aus Zaire beschrieben. Die Vertreter der Gattung *Agaleptus* sind offenbar selten, sie sind auch in den Sammlungen der größeren Museen, falls überhaupt, nur spärlich vertreten.

Anlaß für diese Revision waren zwei in Zimbabwe gefangene *Agaleptus*-Arten, die sich nicht ohne weiteres den bekannten Arten zuordnen ließen; sie haben sich als neu erwiesen und werden weiter unten beschrieben. In der Sammlung des Senckenberg Museums, Frankfurt, fand sich noch ein weiterer Vertreter der Gattung, der als unbeschrieben erkannt wurde, und hier ebenfalls neu beschrieben wird.

Dank und Abkürzungen

Den angeführten Kollegen und Kustoden danke ich sehr herzlich für die Bereitschaft, mir das *Agalptus*-Material ihrer bzw. der ihnen anvertrauten Sammlungen für meine Studien zur Verfügung zu stellen. Ohne diese Hilfe wäre die Revision nicht möglich gewesen.

(A) = Coll. Dr. Karl Adlbauer, Graz
(H) = Coll. Dr. Walter Hovorka, Wien
(M) = Coll. Riccardo Mourglia, Rivoli/Torino
(SMF) = Forschungsinstitut Senckenberg, Frankfurt (Dr. Damir Kovac)
(LMJ) = Steiermärkisches Landesmuseum Joanneum, Graz

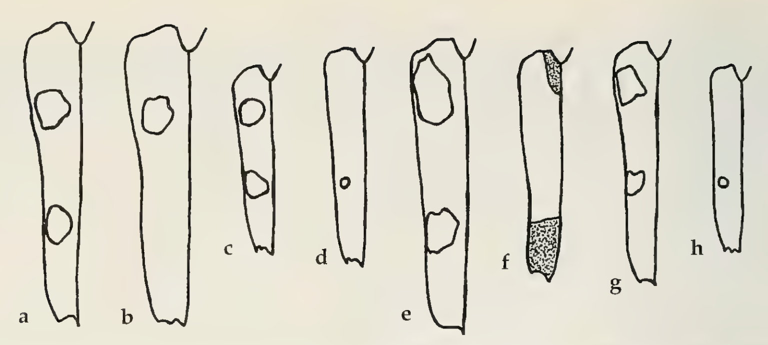


Abb. 1. Linke Elytre. a, b: *A. quadrinotatus* ♂♂; c: *A. quadrinotatus maculatus*, Holotypus; d: *A. zimbabweanus*, Paratypus; e: *A. guttatus*, ♂; f: *A. fulvipennis*, Holotypus; g: *A. tanzanicus*, Holotypus; h: *A. wallabergeri*, Paratypus, ♀.

(MFT) = Museum Frey, Tutzing/München (jetzt Basel) (Dr. Martin Baehr)
(MHB) = Museum der Humboldt Universität, Berlin (Dipl.-Biol. Hella Wendt)
(NHM) = The Natural History Museum, London (S. L. Shute)
(ZSM) = Zoologische Staatssammlung, München (Dr. Martin Baehr)

Agaleptus Gahan, 1904 (1924)*

Gahan, 1904, in: Distant*: 122.

Callichromini kleinerer Dimension (8-15 mm), mit etwas dorsal abgeplattetem, nach hinten leicht verjüngtem Körper. Pronotum seitlich gerundet, ohne Höcker oder Dorn, dorsal mit netzartiger Struktur, die durch große, flache Punkte gebildet wird, auch der Kopf netzartig punktiert.

Antennen beim ♂ länger als der Körper, beim ♀ etwa körperlang oder kürzer. Antennenglieder 3-5 lang und dünn, das 6. ebenfalls lang, aber am Apex kräftig verdickt, 7.-11. kurz und stark verdickt bzw. erweitert. Diese Verdickung bei den kürzeren Antennen der ♀♀ stärker in Erscheinung tretend als bei den längeren der ♂♂. Nur bei *A. wallabergeri*, spec. nov. sind die Endglieder in beiden Geschlechtern ähnlich stark verdickt. Letztes Antennenglied mit deutlich abgesetzter Spitze.

Vorderbeine kurz, Mittel- und Hinterbeine sehr lang, von annähernd gleicher Länge. Die Hinterschenkel überragen nach hinten gelegt den Körper deutlich. Alle Femora kräftig gekeult. Unterseite stets mit mehr oder weniger deutlichen, silbrigweißen Haarflecken bedeckt. Vorder- und Mittelcoxen weit voneinander getrennt.

Die Körpergröße der Geschlechter scheint nicht unterschiedlich zu sein.

Durch das netzarig strukturierte, seitlich gerundete, mehr oder weniger scheibenförmige Pronotum (nur beim ♂ von *A. wallabergeri*, spec. nov. ist es länglich und gewölbt), die langen Mittel- und Hinterbeine und die verdickten letzten Antennenglieder gut von anderen Genera unterschieden. Zur Abgrenzung von den am nächsten verwandten Genera *Agaleptoides* Lepesme, 1956 und *Maynagaleptus* Lepesme & Breunig, 1956 siehe Lepesme (1956).

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* Meine Kopie trägt die Jahreszahl 1924!

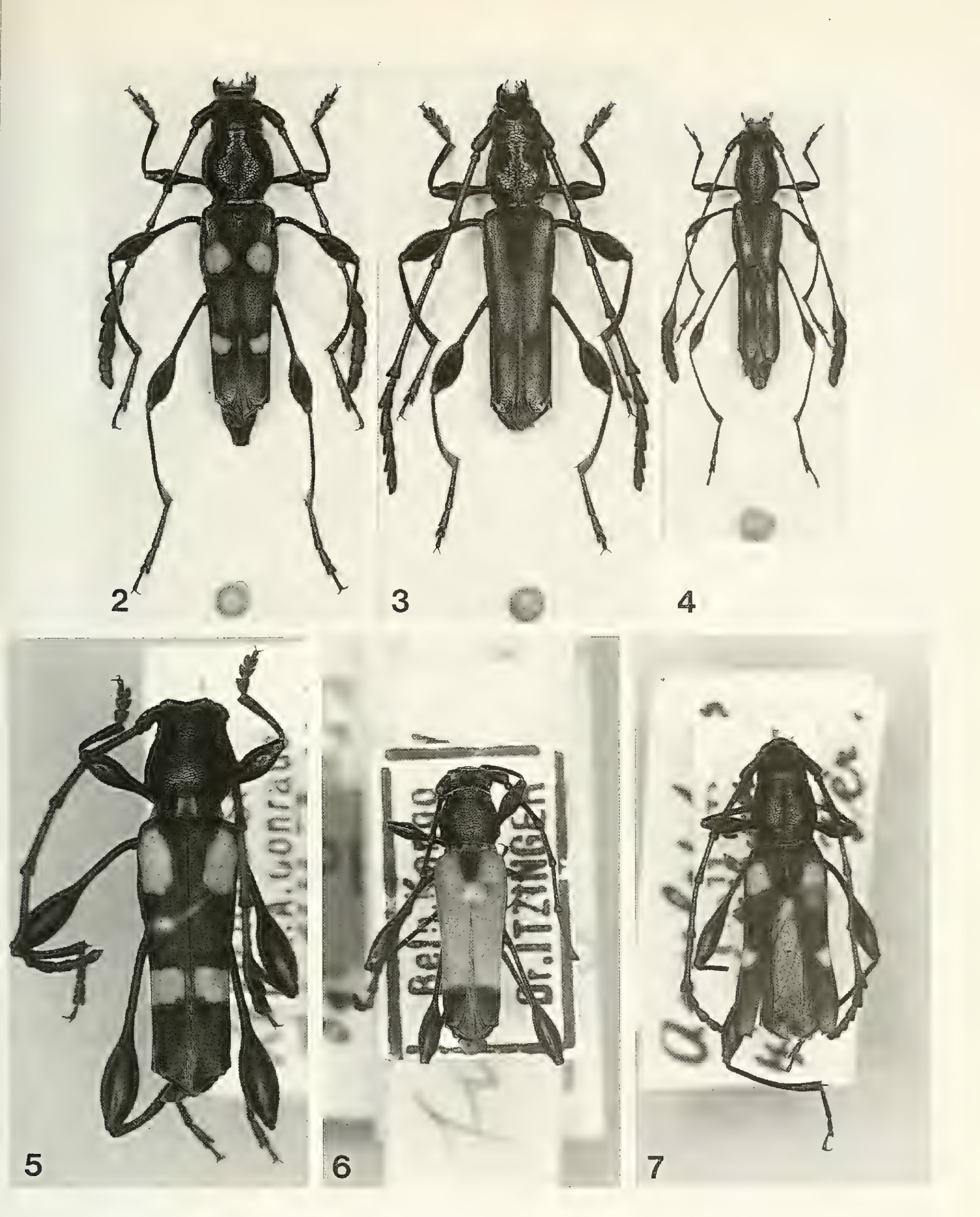


Abb. 2. *A. quadrinotatus* (Per.), ♀, 13 mm (A).
Abb. 3. *A. zimbabweanus*, spec. nov., ♂ Holotypus, 12 mm (A).
Abb. 4. *A. wallabergeri*, spec. nov., ♂ Holotypus, 10 mm (A).
Abb. 5. *A. guttatus* Schmidt, ♂, 14 mm (SMF).
Abb. 6. *A. fulvipennis* Fuchs, ♂ Holotypus, 10 mm (MFT).
Abb. 7. *A. tanzanicus*, spec. nov., ♂ Holotypus, 11 mm (SMF). Fotos: K. Adlbauer.

Agaleptus quadrinotatus ssp.typ. (Peringuey)
Abb. 2

Closteromerus (Helymaeus) quadrinotatus Peringuey, 1888: 179.
Agaleptus quadrinotatus, Gahan 1904 (in: Distant): 122.

Locus typicus: "Banks of the Zambezi River" (vermutlich Mocambique).

Untersuchtes Material: **Somalia:** 1♂, Benadir, Mogadiscio, 70 km, 2.-19.5.1986, R. Mourglia leg. (M); **Kenya:** 2♀♀, Gede forest, 3°16'S/39°55'E, April 1982, G. u. M. Novak leg. (A, M); 1♂, Mombasa, Diani Beach, ex larva, 11.1986, R. Mourglia leg. (M); **Tanzania:** 2♂♂, Deutsch-Ost-Afrika, Namupa, Sammlung J. N. Ertl (ZSM); 1♂, D. O. Afrika, Ndanda, Sammlung J. N. Ertl (ZSM); 1♂, D. O. Afrika, Ndanda, Coll. B. Schwarzer (SMF); 1♀, D. O. Afrika, Morogoro, Coll. B. Schwarzer (SMF); 1♀, Daressalam, Coll. B. Schwarzer (SMF); 2♂♂, D.-Ost-Afrika, Morogoro (MFT); 1♀, B. E. Africa, Usagara (MFT); 1♂, D. O. A., Namupa (LMJ); 1♂, D. Ostafrika, Makond.-Hochld., 15.-16.12.10, H. Grote S. G. (Ntochitochira, Mahuta, Newala) (MHB); 1♂, D. O. Afr., Mikesse, Bezirk Morogoro, W. Janensch S. G. (MHB); **Zimbabwe:** 1♀, Nembudziya (Harare-Lake Kariba), Anf. Jänner 1995, leg. W. Hovorka (H); **Südafrika:** 1♂♀, Krüger Park, Punda Maria, 22.11.1990, P. Stobbia leg. (M); 4♂♂, 2♀♀, Kenya, Zimbabwe und Transvaal (NHM).

Beschreibung

Größe: 8-15 mm.

Eine in der Größe recht variable Art mit blaumetallischer Färbung (ausnahmsweise Kopf und Prothorax schwarz mit metallischem Glanz oder ganz schwarz) und normalerweise je 2 gelben Flecken auf den Elytren, die Antennen sind schwarz.

Kopf und Pronotum mit flacher, gleichmäßiger, wabenartiger Struktur. Die ersten Antennenglieder dicht raspelartig punktiert, die Raspelpunkte in abgeschwächter Form bis zum 6. Antennenglied erkennbar. Ab dem 6. Glied sind die restlichen Glieder kräftig erweitert und matt.

Elytren matt, dicht und fein punktiert, an den Schultern und vor allem am Apex glänzend; sie sind nicht gleichmäßig blaumetallisch, sondern im Umkreis des Scutellums und im Mittelteil der hinteren Hälfte schwarzblau bis schwarz. Im typischen Fall ist der vordere gelbe Fleck größer als der hintere, stets rund, der hintere entweder ebenfalls rund oder aber quer verlaufend. Gelegentlich sind beide Flecken gleich groß – in einem Fall ist der hintere Fleck vollkommen reduziert (14 mm großes ♂ vom LMJ) (Abb. 1a, b). Der vordere Fleck befindet sich von oben betrachtet in der Mitte zwischen Mittel- und Hinterhüften, der hintere am Anfang des letzten Elytrendrittels. Elytrenapex geschwungen und in ein Suturaldörnchen ausgezogen, insgesamt aber sehr variabel ausgebildet. Gelegentlich auch ein Marginalzähnchen vorhanden.

Auf der Unterseite auf allen Coxen, in der Mitte des Mesothorax, auf den Epimeren und Episternen sehr auffällige weiße Haarflecken, außerdem ein ebensolches breites Querband im basalen Teil des Metathorax (hinter den Mittelcoxen) und je ein auffälliger weißer Haarfleck im basalen Winkel auf jeder Seite der Sternite. Auf dem ersten sichtbaren Sternit ist dieser Fleck mitunter etwas zur Mitte verlagert.

Verbreitung: Somalia (erste Meldung), Kenya (erste Meldung), Tanzania, Mocambique, Zimbabwe, Südafrika (Transvaal, Natal) (Veiga Ferreira 1964).

Agaleptus quadrinotatus ssp. *maculatus* Schmidt

Agaleptus quadrinotatus ssp. *maculatus* Schmidt, 1922:192.

Locus typicus: Tanzania, Trockenwald b. Mtotohovu

Untersuchtes Material: Holotypus: ♂, Tanzania, Trockenwald b. Mtotohovu, D. O. A., April 16, leg Methner. *Agaleptus 4 not.* subsp. *maculatus* × m. det. M. Schmidt (MHB).

Größe: 8.5 mm.

Zum Unterschied zur Nominatunterart sind hier die erweiterten Endglieder der Antennen leicht glänzend und die beiden Flecken auf den Elytren sind groß und etwas weiter nach vorne gerückt (Abb. 1c). Ich halte es für wahrscheinlich, daß die angegebenen Trennungsmerkmale in die Variationsbreite von *A. quadrinotatus* fallen und sich die ssp. *maculatus* nicht aufrecht erhalten lassen wird.

Verbreitung: Tanzania (nur der Holotypus bekannt).

Agaleptus zimbabweanus, spec. nov.
Abb. 3

Typen. Holotypus: ♂, Zimbabwe, Rusape, 1450 m, 23.11.1992, auf blühender *Acacia*, K. u. F. Adlbauer u. G. Wallaberger leg. (A). – Paratypen: 1♂, mit den selben Daten (A); 1♂, Zimbabwe, Lake Kyle b. Masvingo, 1070 m, 30.11.1992, auf Gebüsch, K. u. F. Adlbauer u. G. Wallaberger leg (A).

Beschreibung

Größe. 10.5-12 mm.

Sehr nah mit *Agaleptus quadrinotatus* verwandt und nur durch wenige Merkmale unterschieden.

Habitus. Schlanker und nach hinten zu weniger verjüngt als bei gleich großen ♂♂ von *A. quadrinotatus*.

Färbung. Blaugrün, nicht blau wie bei der Vergleichsart. Elytren beim Holotypus ohne Flecken, bei einem Paratypus je ein sehr kleines gelbes Fleckchen am Beginn des hinteren Elytrendrittels (Abb. 1d), beim zweiten Paratypus an dieser Stelle die Andeutung dieses Fleckchens, diese aber nur mit stärkerer Vergrößerung erkennbar. Der vordere, bei der Vergleichsart große und stets vorhandene Fleck, fehlt bei *A. zimbabweanus* völlig.

Unterseite. Die weißen Haarflecken an den gleichen Stellen ausgebildet wie bei *A. quadrinotatus*, aber schwächer entwickelt und weniger deutlich; besonders der Fleck auf dem ersten sichtbaren Sternit fehlt ganz oder ist höchstens als Rudiment in Form von einigen kaum wahrnehmbaren Härchen vorhanden.

Agaleptus guttatus Schmidt
Abb. 5

Agaleptus guttatus Schmidt, 1922: 192.

Locus typicus: Tanzania, Ugogo.

Untersuchtes Material: Tanzania, 2♂♂, 1♀ (♀ ohne Antennen), Insel Ukerewe, Victoria-See, Pat. A. Conrads, XI 204 (SMF); 1♂, D.O.A., Lukuledi (M).

Beschreibung

Größe: 11-14 mm.

Von gleicher Gestalt und Größe wie *A. quadrinotatus*, aber mit anderer Oberflächenstruktur und anders ausgeprägter Zeichnung.

Die Grundfärbung ist ein metallisches Schwarzblau, besonders auf der Unterseite und den Beinen ist die metallischblaue Färbung schwächer ausgeprägt als bei *A. quadrinotatus*, Antennen schwarz. Elytren beim untersuchten ♀ nahezu schwarz, mit schwachem metallischem Schimmer, nur der Apex deutlich blaumetallisch. Die Flecken auf den Elytren sind deutlich größer als bei *A. quadrinotatus*, nicht rund, sondern mehr oder weniger rechteckig und weiter vorne gelegen (Abb. 1e). Der vordere Fleck ist nach vorne verlängert und erreicht die Schulter, der hintere bildet eine an der Sutur unterbrochene Querbinde.

Die netzartige Struktur auf dem Pronotum ist deutlich quer und etwas unregelmäßig. Elytren über die ganze Länge dicht, fein und raspelartig punktiert.

Auf der Unterseite sind die weißen Flecken in ähnlicher Form vorhanden wie bei *A quadrinotatus*, treten jedoch viel zarter und schwächer in Erscheinung.

Verbreitung: Tanzania.

Agaleptus fulvipennis Fuchs
Abb. 6

Agaleptus fulvipennis Fuchs, 1961: 94.

Locus typicus: Zaire.

Untersuchtes Material: Holotypus: ♂, Zaire, Belg. Kongo, Coll. Dr. Itzinger, Typus. *Agaleptus fulvipennis* mihi, E. Fuchs det., 1960, Typus (MFT).

Beschreibung

Größe: 10 mm.

Grundfärbung dunkelrotbraun bis fast schwarz, kein metallischer Schimmer erkennbar (möglicherweise ein ausgebleichtes Tier); Elytren zum größten Teil strohgelb, nur ein dreieckiger, gemeinsamer Scutellarfleck und das letzte Viertel dunkelbraun (Abb. 1f).

Kopf und Pronotum sehr ähnlich wie bei *A. quadrinotatus* regelmäßig netzartig strukturiert, die Elytren fein raspelartig punktiert, Elytrenapex abgestutzt mit deutlicher Marginalecke und einem kurzen Suturaldörnchen.

Auf der Unterseite weiße Haarflecken in der charakteristischen Anordnung erkennbar – beim einzigen verfügbaren Exemplar sind sie aber stark verklebt und schlecht erkennbar. Auf den sichtbaren Sterniten 2-5 sind sie jederseits im Basalwinkel vorhanden, nicht jedoch auf dem ersten Sternit.

Verbreitung: Zaire (nur der Holotypus bekannt).

Agaleptus tanzanicus, spec. nov.
Abb. 7

Holotypus: ♂, Tanzania, Madibira, 09, Coll. B. Schwarzer, Senckenberg Museum (SMFC16247).

Beschreibung

Größe: 11 mm.

Habitus. Mit *A. quadrinotatus* weitgehend übereinstimmend.

Färbung. Kopf inklusive Antennen, Pronotum, Scutellum, Unterseite und alle Beine schwarz, ohne metallischen Schimmer; Elytren schwarzblau, ohne dunklere Stellen, mit je 2 gelben Flecken: ein großer, rhomboidaler hinter der Schulter und ein kleinerer dreieckiger am Ende des zweiten Elytrendrittels, dieser an den Außenrand grenzend (Abb. 1g).

Integument. Netzartige Struktur auf Kopf und Pronotum sehr gleichmäßig und deutlicher entwickelt als bei *A. quadrinotatus*. Elytren dicht und fein punktiert, leicht raspelartig und matt, an der Spitze und den Schultern kaum glänzender. Apex der Elytren ausgeschnitten, mit je einer Sutural- und Marginalecke.

Unterseite. Fein und zart weiß tomentiert, wenig auffällig, Tomentflecken wie bei den verwandten Arten verteilt, jedoch auf den sichtbaren Sterniten 1-4 auf den distalen Winkeln. Außerdem in der Mitte der Sternite 2-4 in der Nähe des Hinterrandes eine Gruppe bürstenartiger, im rechten Winkel abstehende Börstchen.

Agaleptus tanzanicus, spec. nov. unterscheidet sich von allen anderen Arten durch die nicht im proximalen sondern im distalen Winkel der Sternite gelegenen weißen Tomentflecken und die senkrecht abstehenden Börstchen auf den Sterniten 2-4. Charakteristisch ist weiters die schwarze, nicht metallische Grundfärbung, die ansonsten nur noch bei *A. fulvipennis* Fuchs und den ♂♂ von *A. wallabergeri*, spec. nov. festgestellt wurde.

Agaleptus wallabergeri, spec. nov.
Abb. 4

Typen. Holotypus: ♂, Zimbabwe, NW Chimanimani, 1200 m, 28.11.1992, auf blühender *Acacia*, K. u. F. Adlbauer u. G. Wallaberger leg. (A). – Paratypen: 1♂♀, Zimbabwe, Lake Kyle b. Masvingo, 1070 m, 30.11.1992, in Kopula auf trockenem Ast, K. u. F. Adlbauer u. G. Wallaberger leg. (A); 5♂♂, Tanzania, Peramiho 30 km W Songea, Ruvuma prov., 8.12.1994, E. Orbach leg. (M).

Beschreibung

Eine kleine und offensichtlich recht variable Art, die – soweit das nach den vorliegenden Exemplaren beurteilt werden kann – auch eine unterschiedliche Färbung der Geschlechter aufweist.

Größe: 8-11 mm.

Habitus. Wesentlich schlanker als die anderen bekannten Arten.

Färbung. ♂♂ mit einheitlich schwarzer Färbung, ohne metallischem Schimmer, auch die Elytren sind schwarz, mit oder ohne gelbe Flecken. Beim Holotypus sind je 2 längliche Flecken auf den Elytren ausgebildet, ein ovaler am Ende des ersten Elytrendrittels und ein sehr langgezogener, schmaler am Übergang vom 2. zum 3. Drittel. Bei den Paratypen sind die Elytren einfärbig schwarz, ohne Spur einer gelben Zeichnung.

♀ metallisch dunkel-blaugrün, nur die Antennen schwarz. Die Elytren sind blaumetallisch, mit schwarzen Bereichen im ersten Drittel und im Bereich der hinteren Flecken. Auf jeder Elytre ein kleiner, runder, gelber Fleck am Ende des 2. Elytrendrittels (Abb. 1h).

Integument. Kopf und Pronotum mit deutlicher und regelmäßiger Wabenstruktur, das Pronotum ist bei den ♂♂ stärker gewölbt und schmäler als beim ♀. Antennen bei den ♂♂ etwa körperlang bis deutlich länger, glatt, ohne Raspelpunkte, die letzten 6 Glieder sehr stark verdickt. Beim ♀ sind die ersten Antennenglieder raspelig punktiert (wie bei den anderen Vertretern der Gattung), nur wenig kürzer als bei den ♂♂, die Endglieder ebenso verdickt wie bei den ♂♂. Elytren etwas uneinheitlich dicht und fein punktiert, beim ♀ gröber als bei den ♂♂. Apex der Elytren deutlich glänzend, bei den ♂♂ außerdem ein glänzender Bereich, der von den Schultern schräg nach innen zieht. Elytren an der Spitze geschwungen ausgerandet, in ein Apikal-und Marginaldörnchen (bzw.-ecke) ausgezogen.

Unterseite mit den typischen Haarflecken, diese bei den ♂♂ zwar relativ ausgedehnt, aber eher als schwache Tomentierung ausgebildet; beim ♀ sind die weißen Haarflecken dichter und treten markanter hervor, in der normalen Ausdehnung vorhanden.

Während die ♂♂ mit keiner anderen Art vergleichbar sind, hat das ♀ große Ähnlichkeit mit kleinen ♀♀ von *A. quadrinotatus* Per. Es unterscheidet sich von diesen durch das Fehlen des vorderen Elytenflecks (soweit bekannt), dunkler blaugrüne Grundfärbung und im Schulterbereich gröber raspelig punktierte Elytren. Das ♀ von *A. zimbabweanus*, spec. nov. ist unbekannt.

Meinem Freund, Sammelbegleiter in Zimbabwe und Mitentdecker zweier neuer *Agaleptus*-Arten, Gustav Wallaberger, herzlichst gewidmet.

Verbreitung und Biologie

Die am weitesten verbreitete Art, *Agaleptus quadrinotatus* (Gahan), ist aus Somalia, Kenya, Tanzania, Mocambique, Zimbabwe und Südafrika bekannt, *A. wallabergeri*, spec. nov. aus Tanzania und Zimbabwe, alle weiteren Arten sind nur von einem Land nachgewiesen: *A. guttatus* Schmidt und *A. tanzanicus*, spec. nov. von Tanzania, *A. zimbabweanus*, spec. nov. aus Zimbabwe und *A. fulvipennis* Fuchs aus Zaire. Daraus kann abgeleitet werden, daß das Differenzierungszentrum der Gattung im südlichen Ostafrika zu suchen ist. Daß bisher noch keine Art aus Malawi, Zambia oder Botswana festgestellt wurde, dürfte am doch sehr unbefriedigenden Erforschungsstand in Bezug auf die Käferfauna in diesen Staaten und – verbunden damit – dem sporadischen Auftreten der *Agaleptus*-Arten überhaupt liegen.

Die Tiere scheinen keine Arten der Waldgebiete in Afrika zu sein, sondern viel eher typische Savannenbewohner. Sie sind tagaktiv wie die meisten Callichromini und Besucher blühender Bäume und Sträucher. Über Brutsubstrate und Entwicklungspflanzen ist bis jetzt nichts bekannt.

Bestimmungstabelle der *Agaleptus*-Arten

1. Weiße, dreieckige Haar- bzw. Tomentflecken auf den Proximalwinkeln der Sternite .... 2.
– Weiße, dreieckige Tomentflecken auf den Distalwinkeln der Sternite .... *A. tanzanicus*

2. Elytren schwarz, blau oder blaugrün, einfärbig oder mit gelben Flecken .... 3.
– Elytren gelb, nur ein Scutellarfleck und das letzte Viertel dunkel .... *A. fulvipennis*

3. Grundfärbung metallisch blau oder blaugrün .... 4.
– Grundfärbung schwarz .... *A. wallabergeri* ♂

4. Elytren mit je 2 Flecken, zumindest der vordere stets gut entwickelt .... 6.
– Elytren ohne Flecken, höchstens der hintere schwach entwickelt .... 5.

5. Größe 10.5-12 mm, blaugrün, Elytren einfach punktiert .... *A. zimbabweanus*
– Größe 8-11 mm, dunkel blaugrün, Elytren im Schulterbereich kräftig raspelartig punktiert .... *A. wallabergeri* ♀

6. Vorderer Elytrenfleck länglich und eckig, sich verjüngend bis zur Schulter reichend .. *A. guttatus*
– Vorderer Elytrenfleck rund, von der Schulter entfernt .... 7.

7. Vorderer Elytrenfleck von oben betrachtet in der Mitte zwischen Mittel- und Hintercoxen .... *A. quadrinotatus* s. str.
– Vorderer Elytrenfleck etwas weiter nach vorne gerückt .... *A. quadrinotatus maculatus*

Zusammenfassung

Die Gattung *Agaleptus* Gahan, 1904 (Cerambycinae, Callichromini) wird revidiert, dabei werden drei neue Arten aus Tanzania und Zimbabwe beschrieben: *A. zimbabweanus*, spec. nov., *A. tanzanicus*, spec. nov. und *A. wallabergeri*, spec. nov. *Agaleptus quadrinotatus* (Peringuey, 1888) wird zum ersten Mal aus Somalia und Kenya gemeldet.

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Paedomorphosis and morphometric variability: Ontogenetic allometry in European newts of the genus *Triturus*

(Amphibia, Salamandridae)

By **Ana Djorovic** & **Milos L. Kalezic**

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Using bivariate and multivariate morphometric analyses, effects of paedomorphosis on intrapopulation ontogenetic changes in size and shape of three European newt species (*Triturus vulgaris*, *T. alpestris* and *T. carnifex*) are studied. Samples of larvae, efts and adults of two conspecific populations of each species were considered, one with generalized life cycle, the other with paedomorphosis (in a *T. carnifex* population larvae had prolonged growth and metamorphosed during the following year). It was found that existence of an alternative life cycle rendered more complex ontogenetic picture of allometric relations of individual morphometric features, particularily in *T. vulgaris*. In this species paedomorphic individuals followed ontogenetic trajectories of larvae, while metamorphic adults deviated considerably from this trajectories. This was much less significant in *T. alpestris*, another species with high incidence of paedomorphosis, but also in *T. carnifex*, a species with less plastic life-cycle than both previous species. As in the American newts (Harris 1989), differences between non-transforming and transforming individuals in the genus *Triturus* in ontogenetic paths of size and shape changes presumably developed relatively late in ontogeny.

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Introduction

It is the commonly held view that the heterochrony, changes in the timing of developmental events during ontogeny, is among the most prominent mechanisms for phenotypic changes (e.g. McKinney 1988). Allometry, the study of size/shape relations, provides data for assessing heterohronic morphological events (Alberch et al. 1979). If paedomorphosis, sexual maturation of individuals retaining morphology that resembles subadult stages of closely related populations or species (Gould 1977), is to be studied, ontogenetic allometry is relevant. Ontogenetic allometry simply refers to changes in size and shape relationships in individuals with time (Shea 1984, Lande 1985).

Paedomorphosis is frequent in amphibians, especially in Caudata where it occurs due to change in timing of metamorphosis. Metamorphosis consistently occurs in generalized and presumably primitive form of urodele life-history; from eggs laid into aquatic environment larvae are developed and metamorphose into immature individuals (juveniles or efts) who remain mainly terrestrial before reaching sexual maturity. In many urodele species, however, there are populations with individuals following another ontogenetic pathway. Larvae here have prolonged growth, attain sexual maturity and reproduce retaining larval morphology. Immature eft stage is excluded in this path, while adults can have abandoned or delayed metamorphosis. These urodele species exhibit two adult phenotypes

in natural populations. Paedomorphs are adults having such larval characteristics as: external gills and associated hyobranchial structures, an enlarged tail fins, skin often with Leydig cells and larval texture, and characteristics of larval skull. Metamorphs lack all these traits in morphology.

There is considerable interspecific variation among urodeles with paedomorphosis in the degree of retention of larval characteristics. Reilly (1987) found, studying metamorphosis of skull and hyobranchial apparatus, that paedomorphosis in *Ambystoma talpoideum* has profound effects on these osteological structures, while paedomorphosis in salamandrids (Salamandridae; *Notophthalmus viridescens, Taricha granulosa* and *Triturus vulgaris*) is mainly limited to the retention of gill structures to varying degrees. Also, it seems that urodeles species with paedomorphosis differ in the stage of somatic truncation along an ancestral size-shape trajectory (Shaffer 1984, Harris 1989).

Paedomorphosis is rather common in many species of the genus *Triturus*. The smooth newt (*Triturus vulgaris*) and the alpine newt (*Triturus alpestris*) show a high degree of paedomorphosis incidence, particularly in the submediterranean area of the Balkans (Dzukic et al. 1990). In the crested newt (*Triturus cristatus* superspecies) almost an exclusive life-history pathway leads to obligate metamorphosis; i.e. paedomorphosis is extremly rare. So far, there has been no study on paedomorphosis related ontogenetic changes in size and shape of European newts (genus *Triturus*). The main goal of this paper is to compare such intrapopulation changes in three species, *T. vulgaris, T. alpestris*, and *T. carnifex*. Populations with paedomorphosis were studied, as well as conspecific populations with obligate metamorphosis considered here as control groups. The null hypothesis in this study was that the allometric relations of paedomorphs should resemble more those of larval and juvenile individuals than those of metamorphs ones.

Materials and methods

Population Samples

Paedomorphic population of *Triturus vulgaris* from the pond of Velika Osjecenica (Vilusi, Montenegro), further designated as V1, was chosen because of high percentage of paedomorphic individuals (Tucic at al. 1985). Morphometric variables were scored on 205 larval and post-larval specimens collected from this pond. The smooth newt population from pond Česta (Vrsacki breg, Serbia) was a control population (population referred to as V2), as no evidence of paedomorphic individuals was found in the years of its inspection. When larvae from this pond were sampled (July), some were sacrifised and preserved as larval sample, while others were grown under laboratory conditions in order to provide eft sample. In the end of August the majority of larvae metamorphosed; efts were grown for two weeks in terrarium and then preserved. The total population sample contained 111 individuls.

The alpine newt population from Bukumirsko Lake (Montenegro; population referred to as A1) was selected as paedomorphic population. In this lake non-transformed individuals predominated (Radovanovic 1951). Neither larvae nor efts were found in this lake. Efts were sampled in a nearby temporary lake (Crno Lake) separated from Bukumirsko Lake only by a low moraine which presents no barrier to intensive gene flow between the newts of these lakes. We failed to collect larvae from this lake, too. The alpine newt paedomorphic population sample consisted of 169 individuals. Samples of a control alpine newt population (referred to as A2) were taken from the locality of Sirokar (Montenegro, Mt. Prokletije). From here we took a total of 166 newt specimens.

The individuals from Lokanj pond (Montenegro), referred to as C1, have plastic life-history, including the strategy of paedomorphosis (Kalezic et al. 1994). We have sampled here, besides efts and adults, overwintering larvae as well. The total population sample estimated 118 newts. The individuals of crested newts from nearby Ceklin pond are characterized by obligate metamorphosis. This population is a control one in our study and is referred to as C2. From this population morphometric characteristics of 179 individuals were measured.

Measurements

To demonstrate the size and shape changes during newts ontogenesis, the following set of 10 morphometric variables were measured to the nearest 0.1 mm using dial calipers or plastic ruler as appropriate: L: total length, Lcp: body length (measured from the snout to the front edge of cloaca), Lcd:

tail length, Lsv: snout-vent length (measured from the snout to the posterior edge of cloaca), Ltc: head width, Lc: head length (measured from the snout to the angle of the jaw), Pa: forelimb length, Pp: hindlimb length, D: distance between fore- and hindlimbs, and Lh: maximum tail height (measured at the base of the tail from dorsal to ventral edges).

Before they were mesured, the individuals used in this study had been preserved in ethanol for different period of time (from a couple of months to 7 years). In scoring morphometric traits values and their on-going statistical treatment, we may have dealt with a source of potential errors. We are aware that occasional imprecision in measuring might occur due to some morphological distortion which can affect newts during their preservation (Lee 1982, Verrell 1985). The extent of this measurer bias in our study was not determined. But, as individuals of each ontogenetic stage spent approximately the same time in conservation solution, and as it might be supposed that tissue shrinkage due to preservation was not age and paedomorphs/metamorphs dependent, we may assume that this potential error did not introduce any systematic bias into analysis.

Statistical analysis

Since we have treated ontogenetic stages (larvae, efts, adults) of the same population as different categories, obtained sets of measurements could be referred here to as "cross-sectional data" (Cock 1966). These data yield information on the average growth of individual groups. Due to marked sexual size differences in newts (Kalezic et al. 1992), sexes of paedomorphs and metamorphs were separately statistically treated.

Univariate traits were analyzed using one-way analysis of variance (ANOVA) when comparing the significance in difference between trait variability, and two-way analysis of variance when evaluating the significance of paedomorphosis and sex effects on morphometric character diversity. The used measure of bivariate allometry is the regression coefficient of logarithmically transformed data. In this analysis, Lsv was used as an independent size variable. The differences among bivariate allometric coefficients of morphometric characteristics for analyzed forms were tested by Tukey q-test for multiple slopes comparison (Zar 1984).

Patterns of morphological variation were examined by the multivariate methods of principal component analysis (PCA) done on pooled all measurments data. The first component (PC1) of this analysis, which is highly positively correlated with original data, was used as a latent size variable, while the second principal component (PC2) measures organism shape independent of size (Shea 1985, Bookstein et al. 1985 and references therein). The analysis was performed on the variance-covariance matrix (more appropriate when one deals with morphometric data than correlation matrix) of log-transformed variables (done in order to meet the assumption of homoscedascity; Zar 1974).

A test of isometry was performed by comparing PCA eigenvectors to those of an isometric vector (chi-square test; see Jolicoeur 1963). To measure relationship between bivariate and multivariate allometry, Spearman's rank correlations were calculated between the eigenvector loadings for the first component and allometric loadings of each morphometric characters.

Ontogenetic trajectories were obtained for each ontogenetic stage (larvae, juveniles and adults) by linear regression analysis of PC1 scores on PC2 scores. A rate of change in shape relative to size was estimated by the slope of the regression lines.

Results

Morphometric traits variability

The mean values (±one standard error) of 10 morphometric characters for larvae, efts, and adults (females and males were given separately within paedomorphs and metamorphs groups) of examined populations were given in Appendix for *T. vulgaris* (Tab. 1), *T. alpestris* (Tab. 2), and *T. carnifex* (Tab. 3). In the smooth and crested newt population samples efts were significantly larger than larvae individuals for most characters (ANOVA test), while such differences in the alpine newt were much less pronounced. Among the adults, in the smooth newt paedomorphic individuals were significantly smaller than metamorphic ones for both sex; such differences within alpine newt population were much less apparent.

The influence of paedomorphosis effect and sex effect on morphometric variability in the smooth newt appeared to be statistically highly significant for all characters, except for tail height (two-way ANOVA test). In the alpine newt such influences were more selective. Intersex differences in examined morphometric characters were much more pronounced in the crested newt population with obligate metamorphosis than in the population with more plastic life-history traits (ANOVA test).

Bivariate allometry

In the smooth newt population with paedomorphosis (V1) larvae retreated significantly from isometry for many characters, following with metamorphs and efts in decreasing order (Tab. 1). In paedomorphic individuals statistically significant coefficients of bivariate allometry were only in some characters (head dimensions and tail height). In the control smooth newt population (V2) all measured morphometric characters of males had isometrical growth, following by larvae where only tail height had allometric growth. Among efts and females allometry appeared in more characteristics (mainly head dimensions).

In the alpine newt population with paedomorphosis (A1), a number of characters of non-transformed females and some characters of transformed females, expressed statistically significant allometric growth (Tab. 2). Morphometric characters in males (paedomorphic and metamorphic) were almost excusively characterized by isometry. However, in the population of this species with obligate metamorphosis (A2), most characters of larvae and males were with a significant bivariate allometry. In both crested newt populations, the number of significant character allometry decreased from larvae, throught efts to females and males (Tab. 3).

Tab. 1. The significancy of allometric coefficients - testing the slope against a standard 1 - for all analysed form in smooth newt populations. n.s.: isometry; statistically significant allometry *P<0.05, **P<0.001, ***P<0.001. See text for character and population designation.

	V1						V2			
			metamorphic		paedomorphic				metamorphic	
	larvae	efts	♀♀	♂♂	♀♀	♂♂	larvae	efts	♀♀	♂♂
L	***	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Lcp	***	*	**	***	n.s.	n.s.	n.s.	n.s.	**	n.s.
Lcd	**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Ltc	***	***	*	n.s.	**	n.s.	n.s.	***	**	n.s.
Lc	**	*	***	*	**	**	n.s.	n.s.	**	n.s.
Pa	**	n.s.	***	**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Pp	***	***	***	*	n.s.	n.s.	n.s.	**	n.s.	n.s.
D	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Lh	**	*	**	***	**	n.s.	*	n.s.	n.s.	n.s.

Tab. 2. The significancy of allometric coefficients - testing the slope against a standard 1 - for all analysed forms in alpine newt populations. n.s.: isometry; statistically significant allometry *P<0.05, **P<0.001, ***P<0.001. See text for character and population designation.

	A1					A2			
		metamorphic		paedomorphic				metamorphic	
	efts	♀♀	♂♂	♀♀	♂♂	larvae	efts	♀♀	♂♂
L	n.s.	n.s.	*	***	n.s.	*	n.s.	n.s.	*
Lcp	n.s.	n.s.	n.s.	*	n.s.	n.s.	n.s.	n.s.	*
Lcd	n.s.	n.s.	n.s.	**	n.s.	*	n.s.	n.s.	*
Ltc	***	n.s.	n.s.	n.s.	n.s.	***	n.s.	n.s.	n.s.
Lc	n.s.	**	n.s.	n.s.	n.s.	*	n.s.	*	***
Pa	n.s.	*	n.s.	*	n.s.	***	*	**	**
Pp	*	n.s.	n.s.	***	n.s.	*	n.s.	*	n.s.
D	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Lh	n.s.	*	*	n.s.	n.s.	*	***	n.s.	n.s.

Between-ontogenetic-stages pairwise comparisons in allometric coefficients were presented in Tab. 4 in the form of the number of statistically significant differences of nine morphometric variables versus snout-vent length for each population. In both populations of the smooth newt and control population of the alpine newt (A2) there were no statistically significant difference between bivariate coefficients of larvae and efts, but it was not the case in the crested newt populations. Among larvae and adults, most differences existed between larvae and metamorphosed males, especially in the smooth newt population with paedomorphosis (V1). In the population with paedomorphic individuals, efts and paedomorphic females differed in two of nine comparisons. In these populations there was no difference in regression coefficients between efts and metamorphosed females. The difference between efts and metamorphosed females existed in both populations of the crested newt. Efts and males differed only in the populations V1 and C1 (Tab. 4). Statistically significant differences of bivariate allometric coefficients between paedomorphs and metamorphs of the same sex were found in the smooth newt and in the alpine newt only for one character comparison (Tab. 4). Intersex differences within metamorphs existed in the smooth newt population V1, and in populations of the crested newt, while paedomorphic females and males differed in the population A1 for two bivariate relationships. Taking

Tab. 3. The significancy of allometric coefficients - testing the slope against a standard 1 - for all analysed forms in crested newt populations. n.s.: isometry; statistically significant allometry *P<0.05, **P<0.001, ***P<0.001. See text for character and population designation.

	C1				C2			
	larvae	efts	♀♀	♂♂	larvae	efts	♀♀	♂♂
L	*	*	*	*	n.s.	n.s.	n.s.	n.s.
Lcp	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Lcd	*	***	*	n.s.	n.s.	n.s.	n.s.	*
Ltc	n.s.	n.s.	n.s.	n.s.	***	**	n.s.	n.s.
Lc	**	n.s.	n.s.	n.s.	***	***	n.s.	n.s.
Pa	n.s.	**	n.s.	n.s.	*	n.s.	***	n.s.
Pp	*	n.s.	***	n.s.	*	n.s.	**	n.s.
D	*	n.s.	n.s.	n.s.	n.s.	*	n.s.	n.s.
Lh	n.s.	n.s.	n.s.	*	n.s.	***	n.s.	n.s.

Tab. 4. Number of statistically significant differences between bivariate allometric coefficient (q-test) of nine morphometric characters and Lsv as independent variable of larvae, efts, paedomorphs and metamorphs (sexes were separated) in six studied populations. Abbreviations: L: larvae, E: efts, FM: metamorphic females, FP: paedomorphic females, MM: metamorphic males, MP: paedomorphic males. df: degree of freedom. See text for population designation.

	V1 df=297	V2 df=103	A1 df=168	A2 df=158	C1 df=110	C2 df=171
L/E	0	0	/	0	1	2
L/FM	1	0	/	0	0	0
L/FP	0	/	/	/	/	/
L/MM	4	1	/	0	0	1
L/MP	1	/	/	/	/	/
E/FM	0	0	0	0	2	1
E/FP	2	/	2	/	/	/
E/MM	2	0	0	0	1	0
E/MP	2	/	0	/	/	/
FM/FP	1	/	0	/	/	/
FM/MM	1	0	0	0	1	2
FM/MP	1	/	1	/	/	/
FP/MM	1	/	1	/	/	/
FP/MP	0	/	2	/	/	/
MM/MP	0	/	0	/	/	/
Total	16	1	6	0	5	6

Tab. 5. Character eigenvectors and eigenvalues derived from pooled data of larvae, efts, paedomorphs and metamorphs of the six populations. The variables used in the analysis were the logarithms of 10 morphometric characteristics. See text for character designation.

	Eigenvectors		
	PC1	PC2	PC3
L	0.31	-0.06	0.31
Lcp	0.31	-0.16	-0.03
Lcd	0.31	0.03	0.66
Lsv	0.31	-0.15	-0.02
Ltc	0.28	-0.10	-0.58
Lc	0.23	-0.16	-0.14
Pa	0.33	-0.13	-0.22
Pp	0.34	-0.14	-0.12
D	0.36	-0.15	0.18
Lh	0.35	0.92	-0.13
Eigenvalues	0.3825	0.0195	0.0031
% of variance	(93.42)	(4.77)	(0.76)

Tab. 6. Chi-square values obtained from test of isometry (comparing PCA eigenvectors based on covariance matrix with an isometric vector -arc cos $^1/_3$; total df=9). The variables used in the analysis were the logarithms of 10 morphometric characteristics. See text for character designation. P: significance of differences from isometry. *P<0.05; ***P<0.001

	V1	V2	A1	A2	C1	C2
Larvae	2.94	54.88***	/	1.66	5.95	4.88
Efts	21.06*	3.92	17.43*	2.34	8.39	3.12
♀♀ (M)	15.14	4.52	54.58***	59.56***	1.47	2.84
♂♂ (M)	9.69	4.74	18.37*	11.51	5.75	3.03
♀♀ (P)	3.09	/	58.64***	/	/	/
♂♂ (P)	4.97	/	12.67	/	/	/

Tab. 7. Spearman's rank correlation between results of bivariate and multivariate allometry. M: metamorphic individuals. P: paedomorphic individuals.

	V1	V2	A1	A2	C1	C2
Larvae	0.720*	0.418	/	0.300	0.633*	0.833**
Efts	0.500	0.284	0.979***	0.736*	0.845**	0.713*
♀♀ (M)	0.962***	0.833**	0.883**	-0.017	0.600*	0.966***
♂♂ (M)	0.950***	0.828**	0.770*	0.703*	0.946***	0.967***
♀♀ (P)	0.946**	/	0.200	/	/	/
♂♂ (P)	0.427	/	0.217	/	/	/

Tab. 8. Means and standard errors of PC1 and PC2 scores for analysed forms in the smooth newt populations. See text for population designation.

	V1		V2	
	PC1	PC2	PC1	PC2
Larvae	3.06 ± 0.06	-0.31 ± 0.03	2.67 ± 0.10	-0.40 ± 0.10
Efts	2.92 ± 0.05	-0.71 ± 0.02	2.62 ± 0.08	-0.70 ± 0.03
♀♀ (M)	4.13 ± 0.07	-0.46 ± 0.05	3.89 ± 0.08	-0.57 ± 0.05
♂♂ (M)	4.16 ± 0.09	-0.39 ± 0.04	4.05 ± 0.11	-0.36 ± 0.05
♀♀ (P)	4.04 ± 0.06	-0.37 ± 0.04	/	/
♂♂ (P)	3.10 ± 0.07	-0.38 ± 0.04	/	/

into account the total number of statistically significant differences between bivariate allometric coefficients of all nine morphometric characters in larvae, efts and adults comparisons, some trends become apparent (Tab. 4). Populations with paedomorphosis *(T. vulgaris* and *T. alpestris)* were much more different from conspecific populations with obligate metamorphosis than conspecific populations with much less differences in life-history pathways (*T. carnifex*).

Multivariate allometry and ontogenetic trajectories

All morphometric variables were positively correlated with first principal component (PC1) which explained more than 93 % of the total variability in six newt populations (Tab. 5). With the principal component two (PC2) only tail height (Lh) and tail length (Lcd) were positively correlated. PC2 component explained almost 5 % of total variability. Next principal component (PC3) took less than 1 % of total variation, and therefore was not further considered.

The results of assessing multivariate allometry on separate PCA for each forms of analyzed populations were given in tab. 6. The statistically significant differences from isometrical growth were found in paedomorphic population of the alpine newt for efts and both groups of adults, expect for paedomorphic males. In the conspecific control population (A1) such a difference was found only for females. In paedomorphic population of the smooth newt a difference from isometry was found only for efts. All forms in populations of the crested newt had a multivariate isometrical growth.

We also tested the correlation (Spearman's rank correlation) between results of bivariate and multivariate allometry (Tab. 7). These allometries were significantly correlated for metamorphic males and females (except in A2 population) in all analysed populations. Non-transformed newts, however, had decopuled bivariate and multivariate allometries, except for pedomorphic smooth newt females. When preadult stages were considered, only in smooth newt populations (efts) and in populations with obligate metamorphosis of the smooth newt and alpine newt (larvae), these allometries were not correlated.

Means and standard errors of PC2 and PC1 scores for analyzed forms (larvae, efts and adults) were given for the smooth newt (Tab. 8), the alpine newt (Tab. 9) and for the crested newt (Tab. 10). Concomitant bivariate plots of PC1 and PC2 scores and regressions for these formes were presented in Figures 1 and 2 for the populations with paedomorphosis only. The most informative way to compare obtained ontogenetic trajectories of examined newt populations was to test significance of differences of the slopes of regression lines of PC1/PC2 scores for larvae, effts, paedomorphs and metamorphs within populations (Tab. 11). Some trends in these comparisons were obvious. Larvae did not differ from efts in the rate of change in shape relative to size in any studied newt species. Larval and

Tab. 9. Means and standard errors of PC1 and PC2 scores for analysed forms in alpine newt populations. See text for population designation.

	A1		A2	
	PC1	PC2	PC1	PC2
Larvae	/	/	3.00 ± 0.06	-0.31 ± 0.03
Efts	3.06 ± 0.08	-0.71 ± 0.03	2.85 ± 0.06	-0.71 ± 0.02
♀♀ (M)	4.22 ± 0.08	-0.65 ± 0.09	4.23 ± 0.07	-0.65 ± 0.08
♂♂ (M)	4.10 ± 0.10	-0.61 ± 0.07	4.10 ± 0.06	-0.57 ± 0.04
♀♀ (P)	4.22 ± 0.08	-0.56 ± 0.09	/	/
♂♂ (P)	4.17 ± 0.09	-0.51 ± 0.07	/	/

Tab. 10. Means and standard errors of PC1 and PC2 scores for analysed forms in crested newt populations. See text for population designation.

	C1		C2	
	PC1	PC2	PC1	PC2
Larvae	4.22 ± 0.05	-0.51 ± 0.04	3.88 ± 0.09	-0.49 ± 0.04
Efts	4.28 ± 0.07	-0.60 ± 0.03	4.02 ± 0.10	-0.62 ± 0.03
♀♀ (M)	4.76 ± 0.10	-0.65 ± 0.04	4.87 ± 0.12	-0.61 ± 0.05
♂♂ (M)	4.74 ± 0.09	-0.64 ± 0.04	4.74 ± 0.11	-0.62 ± 0.03

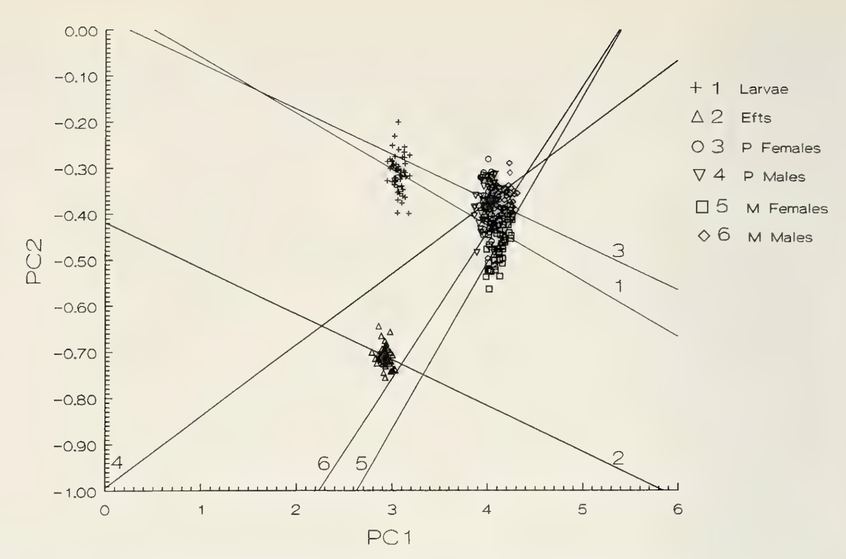


Fig. 1. Bivariate plot of PC1 and PC2 scores and regressions for larvae, efts, paedomorphs and metamorphs (sexes were separated) for the smooth newt population (V1).

paedomorphs' (both sexes) ontogenetic trajectories were not significantly different in the smooth newt; larvae, efts, and paedomorphic females have almost parallel regression lines (Fig. 1). Ontogenetic trajectories of the metamorphs and larvae of the same population showed, however, significant differences. Efts in this population had quite different trajectories from metamorphs, but not from paedomorphs. Within-adult-sex comparisons revealed only significant differences between paedomorphic and metamorphic females, but not between males. In the intersex comparisons paedomorphic females were apparently different from metamorphic males.

Tab. 11. Significancy of differences between regression coefficients (q-test) of PC1/PC2 scores of larvae, efts, paedomorphs and metamorphs (sexes were separated) in six studied populations. Abbreviations: L: larvae, E: efts, FM: metamorphic females, FP: paedomorphic females, MM: metamorphic males, MP: paedomorphic males. n.s.: non-significant, *P <0.05, ** P<0.01, *** P<0.001. df: degree of freedom. See text for population designation.

	V1 df=297	V2 df=103	A1 df=168	A2 df=158	C1 df=110	C2 df=171
L/E	n.s	n.s.	/	n.s.	n.s.	n.s.
L/FM	***	n.s	/	**	n.s.	n.s.
L/FP	n.s	/	/	/	/	/
L/MM	***	n.s.	/	n.s.	n.s.	n.s.
L/MP	n.s.	/	/	/	/	/
E/FM	***	n.s.	n.s.	***	n.s.	n.s.
E/FP	n.s.	/	n.s.	/	/	/
E/MM	***	n.s.	n.s.	n.s.	n.s.	n.s.
E/MP	n.s.	/	n.s.	/	/	/
FM/FP	***	/	n.s.	/	/	/
FM/MM	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
FM/MP	n.s.	/	n.s.	/	/	/
FP/MM	***	/	n.s.	/	/	/
FP/MP	n.s.	/	n.s.	/	/	/
MM/MP	n.s.	/	n.s.	/	/	/

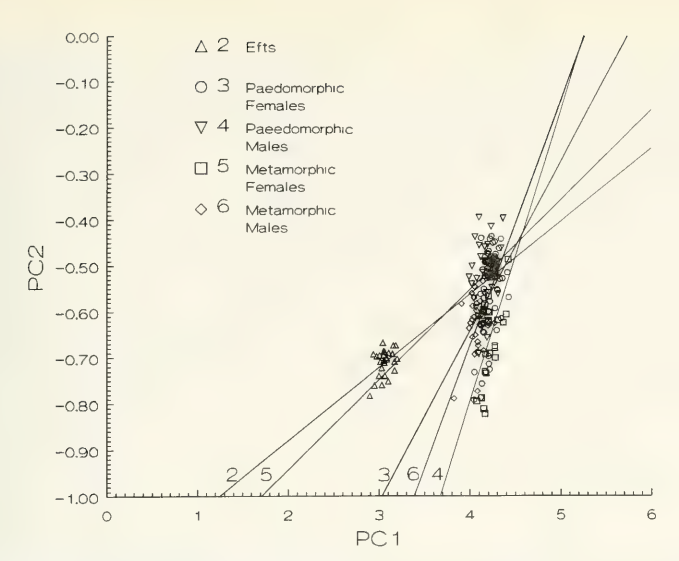


Fig. 2. Bivariate plot of PC1 and PC2 scores and regressions for larvae, efts, paedomorphs and metamorphs (sexes were separated) for the alpine newt population (A1).

Paedomorphic alpine newt population (A1), however, did not show any of such differences; there were no statistically significant differences in size and shape changes among analyzed stages, which was not the case with the control smooth newt population (V2) and with both crested newt populations (Tab. 11). In the alpine newt population with obligate metamorphosis (A2) the regression coefficient of females differed from that of larvae and efts (Tab. 11).

Discussion

A number of populations of the smooth newt (*Triturus vulgaris*) and the alpine newt (*Triturus alpestris*) from the submediterraneans of the Balkans have individuals with polymorphic phenotypes (see Dzukic et al. 1990 for review). Paedomorphs in these populations often outnumber syntopic metamorphs. Even a subspecific level has been attached to some of these alpine newt populations, including the alpine newt population with paedomorphosis studied here. This was based on phenotype differences of its paedomorphic individuals, including morphometric characters (head dimensions), in comparisons with the conspecifics of the nominotypical form which had obligate metamorphosis only.

In the crested newt (*Triturus cristatus* superspecies) there are populations in which numerous larvae have prolonged growth and metamorphose into immature juveniles during the following year. However, a few of the larvae with prolonged growth attain sexual maturity without metamorphosis, thus excluding a juvenile stage. But these individuals, contrary to other European newt species with paedomorphosis, do not stay long as paedomorphs. Up to now, in only one population of *Triturus carnifex* from Montenegro a few sexually mature newts with larval morphology have been found (Kalezic et al. 1994) - this population is included in this study (C1).

We found in this study that larvae did not differ from efts in the rate of change in shape relative to size in any studied newt species. This is another confirmation that the main size and shape changes occurred after metamorphosis, till newts attain sexual maturity (Kalezic et al. in prep.). This was established to be about three years for the newts of all three species studied here from the Balkans (Kalezic et al. in prep., Cvetkovic et al. in prep.), and for the crested newt (*T. cristatus*) from France (Francillon-Vieillot et al. 1990). During this period newts mostly reach their adult size and shape which do not change significantly afterwards. But what happened when metamorphosis is omitted from life cycle?

In the smooth newt, paedomorphic individuals followed ontogenetic trajectories of larvae from the same population, while metamorphic ones deviated from this trajectories considerably. The morphological null hypothesis postulated in this study that the size and shape of non-transforming newts was accounted for by an extention of the larval growth trajectries happened to be confirmed. The situation in the alpine newt population with paedomorphosis is much less clear probably because of inaccessibility of larvae from the population in our study. In this species trajectories of paedomorphic newts depicted no difference in comparison with trajectories of efts and, most likely, they would not do that of larvae too. But, metamorphs of the population did not deviate from this trajectories. Interestingly, the same happened with adults in other newt populations with obligate metamorphosis studied here. If any exception existed, as was the case in such a population of the alpine newt, females were those to deviate significantly from common population ontogenetic size-shape trajectories (Tab. 10). A general conclusion could be that paedomorphosis in some newt species (*T. vulgaris* in our study) has influence on ontogenetic trajectories making somehow metamorphic population counterparts different in this sense. In other cases, paedomorphosis (*T. alpestris* in our study) and more plastic life-history, i.e. prolonged larval period and omitted eft stage (*T. carnifex*), have no such effect. More plastic life-history had, however, an effect on interpopulation level; juveniles and adult males, the only sex with paedomorphic individuals from Lokanj and Ceklin ponds, appeared to be statistically significantly different in the ontogeny of size and shape changes (Kalezic et al. 1994).

Our results of bivariant analysis of shape changes during ontogeny are mainly in the line with the results of multivariate allometry. It was found that the existence of an alternative life cycle rendered more complex ontogenetic picture of allometric relations of individual morphometric features. The changes in allometric relations of paedomorphic and metamorphic individuals were particularly evident in the smooth newt. In this species paedomorphs more than metamorphs, followed the path of larval allometric coefficients. It seems also that paedomorphosis decoupled bivariate and multivariate allometries as the correspondence between these allometries at the adult stage was much more pronounced in transformed individuals than in syntopic paedomorphic individuals.

It should be pointed out here that the sample of larvae taken from the population with paedomorphosis in our study consists of individuals which would have metamorphosed, as well as of those which would have prolonged growth and reached sexual maturity without complete metamorphosis. There was no way of separating these two larvae groups. Due to this fact, as well as to using cross-sectional data instead of longitudinal ones, we were prevented from getting a clearer picture of ontogenetic allometry relations in newt populations. Nevertheless, it became apparent that in European newts, as well as in American newts (genus *Notophtalmus*, Harris 1989) small intrapopulation differences between transforming and non-transforming individuals in ontogenetic paths of size and shape changes developed, if any, and that happened relatively late in ontogeny.

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Appendix

Tab. 1. Mean values and standard error (X±SE) for analyzed forms of two smooth newt populations. n: sample size. See text for character and population designation.

	V1						V2			
			metamorphic		paedomorphic				metamorphic	
	larvae (n=53) X±SE	efts (n=48) X±SE	♀♀ (n=52) X±SE	♂♂ (n=52) X±SE	♀♀ (n=52) X±SE	♂♂ (n=52) X±SE	larvae (n=27) X±SE	efts (n=34) X±SE	♀♀ (n=25) X±SE	♂♂ (n=25) X±SE
L	36.85	35.63	80.56	79.42	75.92	72.40	27.11	27.85	72.00	76.24
	±1.85	±1.88	±4.94	±4.34	±4.25	±3.88	±2.31	±2.02	±4.96	±5.48
Lcp	17.80	17.64	39.56	36.70	36.22	32.45	13.48	14.25	35.29	34.28
	±0.88	±0.73	±2.09	±1.75	±1.97	±1.56	±1.14	±0.84	±2.11	±2.38
Lcd	19.05	17.98	41.00	42.72	39.71	39.95	13.63	13.60	36.71	41.92
	±1.34	±1.38	±3.10	±2.99	±2.66	±2.85	±1.53	±1.35	±3.17	±3.69
Lsv	20.00	19.78	43.29	41.18	39.88	36.96	15.01	15.91	38.96	39.15
	±1.09	±0.84	±2.41	±2.15	±2.08	±1.61	±1.22	±0.92	±2.66	±2.77
Ltc	3.99	3.74	7.60	7.04	7.18	6.62	3.08	3.02	5.91	5.92
	±0.18	±0.13	±0.45	±0.46	±0.45	±0.34	±0.25	±0.14	±0.39	±0.42
Lc	3.03	3.22	5.56	5.77	4.81	4.89	2.53	2.74	4.96	5.20
	±0.21	±0.17	±0.31	±0.33	±0.30	±0.26	±0.24	±0.19	±0.31	±0.39
Pa	6.22	6.48	14.46	16.03	12.72	13.92	4.85	5.08	12.07	14.08
	±0.37	±0.35	±0.74	±1.26	±1.04	±0.95	±0.44	±0.43	±0.90	±1.37
Pp	5.72	6.27	14.05	16.10	12.73	13.95	4.64	4.93	11.87	14.66
	±0.32	±0.33	±0.65	±1.24	±0.81	±1.01	±0.51	±0.33	±0.94	±1.41
D	8.55	8.75	24.47	22.79	22.05	19.26	6.67	7.19	21.82	20.46
	±0.55	±0.82	±1.54	±1.30	±1.34	±1.28	±0.75	±0.49	±1.73	±1.77
Lh	4.99	1.88	8.56	10.17	9.47	9.04	3.07	1.51	5.46	9.73
	±0.45	±0.11	±1.19	±1.47	±0.94	±1.00	±0.71	±0.14	±0.70	±1.55

Tab. 2. Mean values and standard error (X±SE) for analyzed forms of two alpine newt populations. n-sample size. See text for character and population designation.

	A1					A2			
		metamorphic		paedomorphic				metamorphic	
	efts (n=26) X±SE	♀♀ (n=25) X±SE	♂♂ (n=34) X±SE	♀♀ (n=54) X±SE	♂♂ (n=34) X±SE	larvae (n=50) X±SE	efts (n=54) X±SE	♀♀ (n=27) X±SE	♂♂ (n=35) X±SE
L	37.54	87.92	74.59	82.00	76.03	32.36	31.76	90.67	77.74
	±3.34	±4.90	±4.56	±4.60	±5.04	±1.85	±1.68	±5.03	±4.10
Lcp	19.96	45.53	38.73	42.74	38.79	16.95	17.08	45.83	38.17
	±1.11	±2.95	±2.45	±2.57	±2.74	±1.00	±0.88	±2.45	±1.97
Lcd	17.58	42.39	35.86	39.26	37.23	15.41	14.68	44.83	39.57
	±2.68	±3.05	±2.58	±2.84	±3.00	±1.30	±1.00	±3.37	±2.95
Lsv	22.10	50.66	44.16	47.46	44.69	18.81	18.89	50.21	44.34
	±1.17	±2.81	±2.88	±2.98	±2.85	±1.04	±0.87	±2.42	±2.42
Ltc	4.49	9.10	8.19	10.13	9.86	4.07	3.89	8.57	7.74
	±0.19	±0.73	±0.65	±0.85	±1.16	±0.21	±0.19	±0.70	±0.52
Lc	3.47	6.36	6.05	6.21	6.03	2.89	3.11	6.13	5.89
	±0.22	±0.33	±0.44	±0.56	±0.51	±0.24	±0.21	±0.38	±0.29
Pa	7.32	16.78	16.54	17.31	17.53	6.33	6.29	16.68	15.67
	±0.46	±1.89	±1.16	±1.69	±1.28	±0.43	±0.40	±0.82	±1.05
Pp	6.98	17.03	16.31	16.64	17.14	5.75	5.85	16.31	15.41
	±0.44	±1.58	±1.28	±1.26	±1.25	±0.42	±0.46	±0.87	±0.89
D	9.95	25.38	22.78	23.39	21.88	8.61	8.84	27.20	22.24
	±0.73	±2.91	±1.86	±1.88	±1.80	±0.65	±0.53	±2.26	±1.40
Lh	2.15	6.29	6.32	7.75	8.13	4.85	1.81	6.18	6.60
	±0.21	±1.53	±1.25	±1.74	±1.45	±0.44	±0.11	±1.22	±0.82

Tab. 3. Mean values and standard error (X±SE) for analyzed forms of two crested newt populations. n: sample size. See text for character and population designation.

	C1				C2			
	larvae (n=35) X±SE	efts (n=43) X±SE	♀♀ (n=21) X±SE	♂♂ (n=19) X±SE	larvae (n=40) X±SE	efts (n=90) X±SE	♀♀ (n=29) X±SE	♂♂ (n=20) X±SE
L	83.89	89.67	130.81	123.89	64.18	73.93	142.48	122.80
	±3.53	±6.16	±9.31	±8.16	±5.50	±5.86	±12.50	±10.40
Lcp	43.00	47.19	67.71	64.43	34.63	39.98	73.80	65.26
	±1.92	±2.29	±5.40	±4.36	±2.50	±2.76	±6.16	±3.83
Lcd	40.89	42.49	63.10	59.47	29.54	33.93	68.69	57.54
	±2.27	±4.28	±4.69	±4.41	±3.82	±3.92	±7.00	±7.17
Lsv	46.69	51.51	74.43	72.57	37.14	43.72	*81.66	73.84
	±2.05	±2.43	±6.20	±4.50	±2.74	±2.94	±7.01	±4.50
Ltc	9.19	8.77	12.84	12.46	7.39	7.34	14.00	12.49
	±0.53	±0.53	±1.13	±0.96	±0.47	±0.56	±1.31	±0.75
Lc	5.91	6.26	8.30	8.09	5.05	5.54	8.79	7.93
	±0.31	±0.39	±0.68	±0.52	±0.27	±0.51	±0.73	±0.67
Pa	16.41	17.36	24.43	25.79	12.82	14.85	25.21	25.70
	±0.80	±0.81	±1.88	±2.02	±0.94	±1.10	±1.78	±2.38
Pp	16.76	17.95	24.98	26.49	12.69	14.35	25.50	26.39
	±0.77	±0.85	±1.53	±1.67	±0.89	±1.12	±1.87	±2.39
D	23.44	26.89	40.56	38.71	18.23	23.04	44.93	39.97
	±1.68	±1.76	±4.31	±2.83	±1.65	±2.17	±4.52	±3.59
Lh	8.35	7.22	9.57	9.68	6.74	5.70	11.29	10.18
	±0.83	±0.62	±1.14	±1.36	±0.79	±0.70	±1.80	±1.14

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Habitat isolation and habitat quality – consequences for populations of the *Rana esculenta/lessonae*-complex

(Amphibia, Anura, Ranidae)

By **Andreas Zahn**

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The influence of habitat quality and habitat isolation on populations of *Rana esculenta / lessonae* was studied in two areas in southern Bavaria. In area A there was a high density of ponds and a large frog population. In area B pond and population density were low. In area A the size of the stocks and the reproduction rate depended on characteristics of the ponds (sun, depth, vegetation). The highest stock sizes were found in two types of sunny ponds with rich vegetation and it was only in these ponds that a high reproductive success was reached. A cluster analysis was made to decide which types of ponds the frogs preferred, whether these types also exist in area B, and whether the number of frogs in the ponds of area B correspond to the habitat quality. Only parts of area B were inhabited by frogs. The size of the stocks was correlated to the number, size and distance of the neighbouring ones. The percentage of preferred types of ponds was lower in area B than in A, and additionally most of the ponds in area B had lower stock sizes than the habitat quality would lead to expect. In area B the highest frog population was found in the part with the highest density of ponds. It is the isolation of the habitats and not the habitat quality alone which seems to limit the population in area B. The ratio of *R. esculenta* to *R. lessonae* was higher in area B than in area A. The low percentage of *R. lessonae* in B is a possible explanation for the low reproductive success in this area. In both areas the ratio of *R. esculenta* was higher among juveniles than among the adults of a pond. A different preferred habitat type of *R. esculenta* and *R. lessonae* is discussed to compensate the higher number of metamorphosing *R. esculenta*. Ponds of different types show a different ratio of *R. esculenta* to *R. lessonae*, the highest percentage of *R. esculenta* being found in ponds with sparse vegetation.

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1. Introduction

The degree of isolation of animal populations plays an important role in evolutionary history. Size and distribution of habitats determine wether a species will colonise an area and whether neighbouring stocks of a species share a common gene pool.

For a population the probability of becoming extinct rises with the decreasing size of the population and increasing isolation. Reasons for extinction may be a low degree of heterozygoty and polymorphism but there is also a greater risk of extinction caused by stochastic events (Gilpin 1987, Hanski & Gilpin 1991, Loeschke 1988, Nunney & Campbell 1993, Torbjörn 1991). Additionally population survival is strongly influenced by habitat quality (Mühlenberg et al. 1991, Hanski 1991).

This paper reviews the results of a study of the influence of habitat isolation, habitat quality and species composition on mixed populations of *Rana* kl. *esculenta* (Linnaeus, 1758) and *Rana lessonae* (Camerano, 1882).

Isolation of habitats seems to cause the extinction of *Rana lessonae* in ponds on the northern periphery of its geographical range in Sweden (Sjogren 1991, 1994). Blab (1986) mentions that these species became extinct in still existing habitats after a large number of ponds had been destroyed. He also states that of all amphibian species in central Europe *Rana* kl. *esculenta* and *Rana lessonae* have the highest requirements with regard to the habitat structure of reproduction habitats. For reproduction both depend on permanent ponds with rich vegetation and little shade (Blab 1986). Furthermore reproductive success is influenced by the species composition and the genetic structure of mixed *Rana* kl. *esculenta-lessonae* populations (Günther 1983).

The present study, however, is the first that considers the interaction of these different factors that influence the development of *Rana* kl. *esculenta-lessonae* populations.

2. Methods

2.1. The *Rana* kl. *esculenta*/*Rana lessonae*-complex

Rana kl. *esculenta* is a hybrid of the species *Rana lessonae* and *Rana ridibunda* (Pallas, 1771) and it is distributed throughout Central and Eastern Europe. *Rana ridibunda* (from now on referred to as *R.r.*) and *R. lessonae* (from now on: *R.l.*) prefer different habitats. *R.r.* is found in lakes or ox-bows and *R.l.* in small ponds. Both species live ashore during summer. *R.l.* hibernates on land and *R.r.* at the bottom of lakes and rivers (Blab & Vogel 1989).

In most regions the hybrid *Rana* kl. *esculenta* (from now on: *R.e.*) lives sympatrically with one of its parental species and can be found in many kinds of waters (Wijnands 1977, Heym 1974). It hibernates on land or in water, depending on the area and the type of habitat. For successful reproduction *R.e.* depends on mates of the parental species. In areas where *R.e.* lives together with *R.l.* (as in the study area), it excludes the parental *R.l.* genome prior to meiosis, reduplicates the other (*R.r*) and clonally transmits it to eggs and sperm cells. *R.e.* has to mate with *R.l.* to regain the lost *R.l.* genome. Mating between *R.e.* and *R.e.* occurs, but results in very little offspring. *R.e.* seem to prefer *R.l.* mates (Abt & Reyer 1993). For a review of this complex genetic situation see Günther (1983, 1990), Günther & Plöthner (1988), Berger (1983) and Eikhorst (1988).

2.2. Conception of the study

The study was conducted in two areas characterised by different densities of ponds (Tab. 1). In the first area the pond density was high and the influence of habitat isolation was assumed to be low. Here I determined habitat criteria of main importance for population size and reproductive success. In the second area, pond density was low. Here the influence of habitat isolation on the frog population was investigated. I used the important habitat criteria determined in the first area to decide whether there were less frogs in the isolated ponds of the second area than the habitat structure would lead to expect. I determined the species composition in both areas and in ponds of different habitat structure.

Tab. 1. Comparison of areas A and B.

	area A	area B
size	36 km²	200 km²
number of ponds	36	42
ponds/km²	1	0.21
additional ponds (see 2.7.)	30	21
geography	morains of the last ice age	morains of the older ice ages and glacial gravel fields
elevation above sea level	416-565	413-550 m

2.3. Areas

The investigation was performed in the south-eastern part of Upper Bavaria, Germany, from April to September 1988. A mixed population of *R.e.* and *R.l.* exists in this region. Table 1 shows a comparison of both study areas. Area A is located about six kilometres to the west of area B. There is no big difference in climate but agriculture is more intensive in B than in A (higher percentage of fields and fewer meadows and pastures). In both areas most ponds are small and rarely exceed 1000 m^2

2.4. Population data

The numbers of adult and subadult frogs in each pond were counted at least four times between May and June 1988. On warm and sunny days most of the animals sat ashore facilitating counting. Adults and subadults were distinguished by means of their size. The variable used to describe the stock size of a pond is the median of the counted adult frogs (FR. AD). I also determined the total number of frogs (adults and subadults).

In order to determine the reproductive success, I estimated the number of metamorphosed juveniles in a pond in August. Since it was difficult to determine the exact numbers, I used a very rough classification:

no juveniles seen =	no reproduction success (REPR -)
less than 30 juveniles counted =	little reproductive success (REPR +)
more than 30 juveniles counted =	high reproductive success (REPR ++)

From May to July I estimated the ratio of adult *R.l.* to *R.e.* Since *R.l.* and *R.e.* look very similar, 486 individuals were caught in both areas and determined on the basis of biometrical characteristics. Triploid *R.e.* which would have complicated the genetic situation and which are difficult to determine on the basis of biometrical characteristics did not exist in the area (Zahn 1990). In ponds with high reproductive success (REPR (++)) I also estimated the *R.e.* ratio of the metamorphosed juveniles.

2.5. Characteristics of the ponds

Area A has 36 ponds and area B 42 (Tab. 1). Six of the ponds in area A and nine of area B are periodic water bodies. In order to characterise the habitat structure I determined the following variables at all the ponds in both areas:

- surface (m^2)
- length (m) and proportion (%) of sunny, partly shaded and shaded shoreline
- mean shading (%) during the day (estimate)
- area (m^2) and proportion (%) of the pond covered with reeds (differentiated into sunny, partly shaded and shaded)
- area (m^2) and proportion (%) of the pond covered with webbed leaf vegetation and webbed vegetation
- area (m^2) and proportion (%) of the pond covered with submerged vegetation
- mean and maximum depth (cm)
- occurrence of fish; special features (e.g. inflow, runoff)

The shading of a pond was estimated. Areas defined as beeing "sunny" were shaded less then 50 % of the day, areas defined as beeing "partly shaded" were shaded 50-90 % of the day and areas defined as beeing "shaded" were shaded more than 90 % of the day.

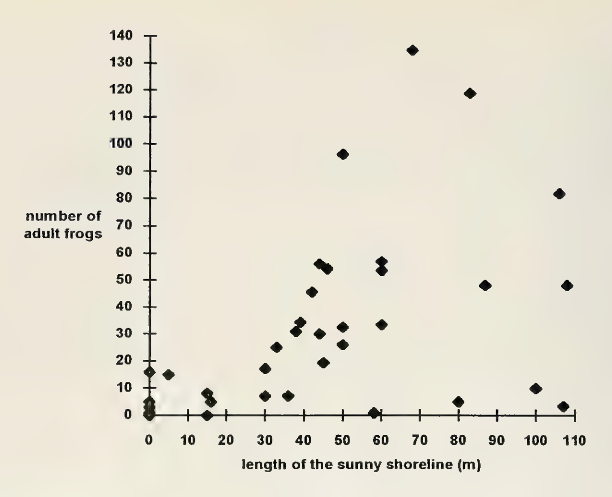


Fig. 1. Influence of the factor "sun" on stock size (Spearmans rank correlation coefficient, r=0.59).

2.6. Neighbouring ponds

Neighbouring ponds were defined as all the ponds within the radius of two kilometres of a given pond. To investigate the influence of the neighbouring stocks on the number of frogs in a given pond, I determined the following variables for every pond:

- number and size of the neighbouring ponds
- number and size of the frog stocks in neighbouring ponds
- reproductive success in neighbouring ponds

For each pond the probability of immigrating frogs was assumed to rise with the size of the neighbouring stocks and according to proximity. To accommodate this assumption, I calculated a new variable (N.AD):

N.AD = sum of all adult frogs of neighbouring ponds, whereby the number of frogs of each pond (FR.AD) is divided by the logarithm (log) of the distance to the focus pond. The logarithm was chosen to avoid overestimation of the influence of nearby stocks.

$$N.AD = \sum \frac{\text{number of adult frogs in the neighbouring pond}}{\text{logarithm of the distance to the focus pond}}$$

2.7. Additionally studied neighbouring ponds

In order to examine the influence of neighbouring stocks on the stocks in ponds situated at the edge of the study areas, I investigated additional waters in a two kilometre wide belt encircling each area to determine all the neighbouring stocks. I found 30 ponds in the belt around area A and 21 in the belt around B (Tab. 1). The only data taken from the ponds outside the study areas consisted of the number of frogs, their reproductive success and the distance from the focus ponds in the study areas.

2.8. Statistics

For purposes of statistical analysis Spearman's rank correlation coefficient (two tailed signif.), the chi-square test and the U-test (two tailed signif.) were used (Zöfel 1992). To group the ponds into certain types a cluster analysis was made.

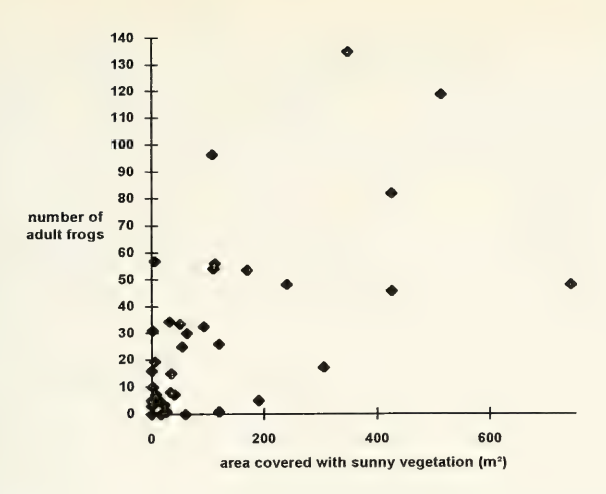


Fig. 2. Influence of the factor "vegetation" on stock size (Spearmans rank correlation coefficient, r=0.55).

3. Results

3.1. Area A (high pond density)

3.1.1. Population size and ratio of *R.e.* and *R.l.*

With the exception of one totally shaded periodic water body, I found frogs in all the ponds of area A with a total number of about 1130 adult frogs beeing counted altogether. The median stock size was much higher than in area B. (Tab. 2). *R.l.* and *R.e.* occurred in mixed stocks wherever either of them are able to prevail. 363 adult frogs altogether were caught and determined, whereby the overall ratio of *R.e.* was 55 %. In seven cases it was possible to compare the *R.e./R.l.*-ratio of adult and juvenile frogs. In every case, the percentage of *R.e.* was higher in the sample of juveniles then in the sample of adults (Fig. 3).

3.1.2. Habitat features and stock size

In area A there was no correlation between the stock size of a pond and the number and distances of neighbouring stocks (N.AD). It would seem that the size of a stock was regulated by the features of its habitat as the number of adult frogs was significantly correlated to decreasing degree of shade, increasing depth and increasing vegetation cover of a pond (Tab. 3).

Fig. 1 shows that the factor "sun" determines the maximum possible size of the stocks, but sunny ponds with rather few frogs were also observed. Therefore this factor (as well as depth) can be regarded as necessary but not sufficient for high population density. Contrary to this, increasing vegetation cover of the ponds (in most cases connected with little shade) results in increasing frog stocks (Fig. 2).

Tab. 2. Comparison of the frog populations in both area.

	area A	area B
median stock size (adults) of ponds with adult frogs (area:N=35, area B:N=17)	26	5
maximum stock size (adults) of ponds with adult frogs (area A:N=32, area B:N=17)	135	25
R.e. ratio of all adult frogs caught (area A: N=363, area B: N=123)	55%	71%
mean N.AD (neighbouring frogs)	270	11
percentage of ponds with reproductive success	42%	16%

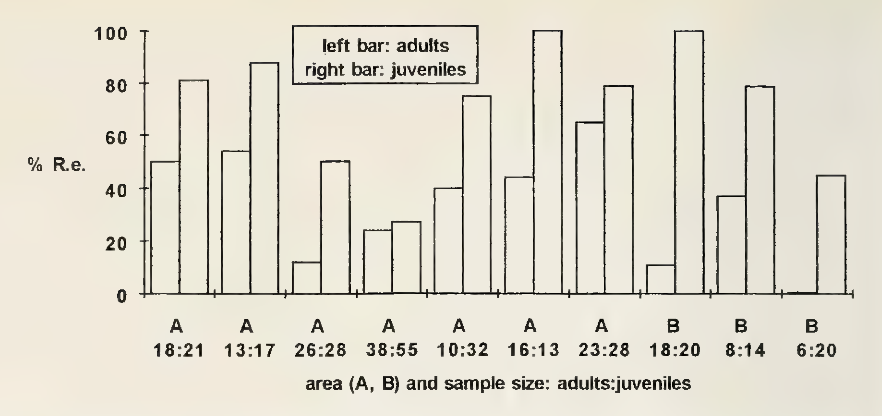


Fig. 3. Comparison of the *R.e.* ratio in adults and juveniles (10 ponds. A: pond of area A; B: pond of area B. The mean percentage of *R.e.* in these ponds was 34 amongst the adults (N=176) and 64 amongst the juveniles (N= 249).

Reeds seem to be less important for the frogs (r <0.37, not significant) than webbed leaf and submerged vegetation (Tab. 3), but does not seem to be without influence for there is a more increased correlation between vegetation and stock size if reed vegetation is included (Tab. 3).

Stocks (FR. AD) were significantly smaller in periodic ponds (mean 2, N=6) than in permanent ponds (mean 37, N=30; U-test, p<0.01).

15 ponds with fish (different species of Cyprinidae) had significantly more adult frogs (mean 46) than 21 ponds without fish (mean 21; U-test, p=0.01).

3.1.3. Frog reproduction in area A

In 50 non periodic ponds inhabited by adult frogs, including those in the two-kilometre-wide belt encircling the area, frog reproduction was potentially possible; however I found metamorphosed juveniles (indicating reproduction) only in 21 of them (42 %). High reproductive success (REPR ++) was only achieved in 11 ponds (22 %).

Ponds with low or high reproductive success (REPR +/++) had significantly more frogs, a longer stretch of sunny shoreline and more vegetation (U-test, p=0.05) than the ponds without reproductive success in area A. Ponds with high reproductive success (REPR ++) featured in particular less mean shade (U-test, p=0.02) and rich vegetation with a higher percentage of submerged and webbed leaf vegetation (p<0.01) than ponds with no reproduction (REPR -). Tab. 4 shows the differences between ponds with high and no reproductive success (REPR ++ and -). In shaded or periodic ponds, spawn or tadpoles were not found at any time.

Tab. 3. Significant correlations (r) between stock size and features of the ponds in area A (Spearmans rank correlation coefficient, p<0.05).

features of the ponds	number of adult frogs (FR. AD)	total number of frogs (adult+subadult)
mean shade of the ponds	-0.57	-0.59
length of sunny shoreline	0.59	0.53
mean depth	0.57	0.50
area covered with vegetation; m² (sum of sunny reed, webbed and submerged vegetation)	0.55	0.57
area covered with webbed and submerged vegetation, m² (without reed)	0.47	0.50

The same factors that correlate with the number of frogs are also important for successful reproduction.

However the high reproductive success of a pond is not just the result of high stock size as proved by the fact that up to 100 adult frogs were counted in ponds in which frog reproduction was not observed. In those cases there was only very little vegetation in the pond. On the other hand, three of the ponds with high reproductive success (REPR ++) were inhabited by no more then 35 adult frogs.

3.2. Area B (low pond density)

In area B I studied the influence of the habitat isolation on the frog population. Compared with area A, area B displayed significantly fewer ponds/km^2, fewer ponds with reproductive success, a higher ratio of *R.e.* (chi-square; $p<0.05$) and lower stock sizes (U-test, $p<0.01$; tabs. 1, 2).

3.2.1. Population size and ratio of *R.e.* and *R.l.*

Frogs were found in only 20 of the 42 ponds within the area and in 14 of the 21 ponds in the two-kilometre-wide belt surrounding area B. The stocks were mostly small (Tab. 2) and occurred only in the southern part of the area. Three ponds were only inhabited by a few subadult frogs, which had probably immigrated. A sample of 123 frogs featured 71 % *R.e.* Only 13 ponds were inhabited by mixed stocks of *R.e.* and *R.l.*, and in the other waters only *R.e.* was found.

In three cases I caught enough adult and juvenile frogs to compare the ratio of *R.e.* to *R.l.* in both age groups whereby the percentage of *R.e.* among the juveniles was in all cases higher than among the adults (Fig. 3). The mean percentage of *R.e.* was 34 amongst the adults (N=32) and 64 amongst the juveniles (N=54).

3.2.2. Correlation between stock size and neighbouring stocks

In area B, the main factor determining the size of a frog stock seemed to be the number and size of the neighbouring stocks and their distance from the given stock: The number of adult frogs in a pond was significantly correlated to the N.AD variable representing distances and sizes of the neighbouring stocks within the radius of 2 km (Tab. 5 and Fig. 4). If the subadult frogs are added to the number of adults, the correlation to N.AD becomes more significant. The highest correlation coefficient was calculated after exclusion of periodic ponds and ponds with a mean shade of more than 70 % from the analyses (these ponds beeing suboptimal for frogs according to the observations made in area A).

Generally the habitat structure had less influence in area B than in A. Contrary to area A, shade, depth and vegetation were not significantly correlated to the numbers of frogs in the ponds.

Tab. 4. Significant differences in area A (U-test, $p<0.05$) between ponds with high reproduction and without reproduction (REPR (++): n=9; REPR (-): n=23).

variable	ponds without reproductive success		ponds with high reproductive success	
	mean	std div.	mean	std. div
number of adult frogs	17	23.7	63	41.0
adult frogs per m^2 of the pond	0.24	0.5	0.46	0.5
length of sunny shoreline (m)	34	32.1	62	25.5
percentage of sunny shoreline (%)	53	41.3	84	23.3
mean shade of the pond (%)	35	37.1	3	6.5
mean depth (cm)	34	29.4	67	26.9
webbed leaf vegetation (m^2)	1	3.9	130	193.4
webbed leaf vegetation (%)	1	2.3	29	37.0
submerged vegetation (m^2)	8	22.1	67	108.4
total vegetation (m^2)	42	52.3	281	164.2
total vegetation (%)	30	36.3	91	7.4

3.2.3. Reproduction

In two ponds of area B reproduction was successful and three other ponds with frog reproduction were found in the two-kilometre-wide belt surrounding the area. Therefore I found metamorphosed juveniles only in five of the 31 ponds (=16 %) supportive of frog reproduction, beeing non-periodic and featuring adult frogs.

3.3. The influence of pond type on stock size and species composition

3.3.1. Stock sizes in different types of ponds

To answer the question of whether the number of frogs in the ponds in area B (low pond density) was indeed smaller than would be expected from the habitat quality, a cluster analysis was made. I grouped the ponds of both areas into types that differ in habitat structure. The stock sizes of each pond type in area A were then determined and compared to the stock sizes of the same type in area B (as shown in 3.1.2., the stock size in area A was correlated to features of the habitat).

The variables used for the cluster analysis included the ratio of sunny shoreline (%), depth (m) and ratio (%) of the types reed, submerged vegetation and webbed leaf vegetation. The ratio of the shoreline, respectively the vegetation was used to group the ponds into different "morphological" types irrespective of their size. The variables were standardised (mean=0, variance=1) to avoid varying importance of the pond features employed in the analyses.

The cluster analyses resulted in four groups of ponds characterised by the following features (Tab. 11 shows the ratio of the different types in both areas):

Cluster 1: sunny; shallow to deep; sparse or no vegetation (=type 1: sunny-bare).
Cluster 2: sunny; shallow; rich vegetation (dominated by reed). It consisted of a "permanent" and a "periodic" group (= type 2: sunny-vertical vegetation).
Cluster 3: sunny; mostly deep; rich vegetation whereby submerged and webbed leaf vegetation are dominant (= type 3: sunny-horizontal vegetation).
Cluster 4: shaded; mostly shallow; sparse vegetation. It consisted of a "permanent" and a "periodic" group (= type 4: shaded-bare).

Tab. 5. Significant correlations (Spearmans rank correlation coefficient) between stock size and neighbouring stocks (N.AD), in area B.

N.AD correlated to:	R ($p<0.05$)	N
number of adults	0.73	42
number of adults + subadults	0.77	42
number of adults + subadults (suboptimal ponds excluded)	0.82	28

Tab. 6. Stock sizes of different pond types (clusters) in area A.

	adult frogs				
pond type (Cluster)	mean	std. div.	min.	max.	N
1	24.5	18.0	3.5	57.0	8
2 perman.	39.3	13.1	25.0	56.0	6
2 period	2.0	2.0	0.0	5.0	3
3	63.7	43.3	5.0	135.0	10
4 perman	8.5	6.1	0.0	16.0	6
4 period.	1.3	1.5	0.0	3.0	3

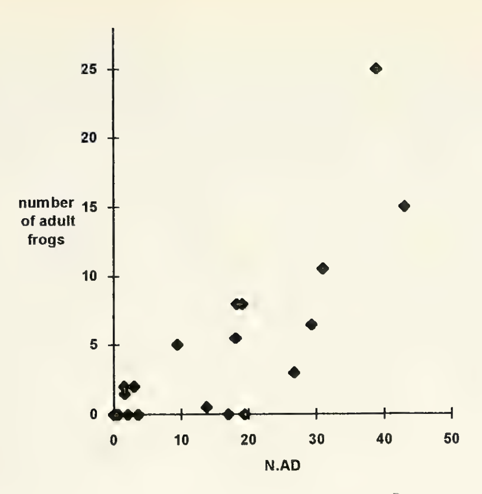


Fig. 4. Influence of the neighbouring stocks on the stock size of the ponds in area B (Spearmans rank correlation coefficient, r=0.73).

Starting out with the area A ponds, I looked for differences between the clusters in the number of frogs. The permanent ponds of cluster 2 and the ponds of cluster 3 are characterised by the highest numbers of frogs. Only in ponds of these two types a high reproductive success (REPR ++) was observed. Tab. 6 shows the stock sizes of the pond types. Significant differences are shown in tab. 7. The stocks of the different clusters can be described as in tab. 8.

These differences between the stock sizes of the pond types did not occur in area B (low pond density).

As in area A, few frogs were found in the periodic ponds of area B. In the permanent ponds (which are generally more suitable than periodic waters) however, the number of frogs did not depend on the pond type but on the number of frogs in their neighbourhood. The higher the mean value of N.AD (see 2.5.) of a cluster, the higher the mean number of frogs living in this pond type (Tab. 9). Contrary to area A, sunny ponds with horizontal vegetation (cluster 3), and in particular permanent sunny ponds with vertical vegetation (cluster 2), were not characterised by a high number of frogs (Tab. 9). Thus the stocks in the ponds of high habitat quality in area B were much smaller than the findings of area A would have led to expect.

3.3.2. Ratio of *Rana* kl. *esculenta* to *Rana lessonae*

R.e. and *R.l.* may have different habitat preferences and therefore I looked for differences in the clusters with regard to the ratio of *R.e.* and *R.l.* in area A. Ponds of type 1 (sunny-bare) had a significantly (U-test, $p<0.02$) higher ratio of *R.e.* (85 %) than the types 2 (42 % *R.e.*) and 3 (58 % *R.e.*) with rich vegetation (Tab. 10). It would seem that *R.l.* prefers ponds with rich vegetation (type 2 and 3) and that *R.e.* prefers or tolerates ponds with sparse vegetation (type 1).

Tab. 7. Significant differences of the stock sizes in the four types of ponds in area A (U-test; ns: not significant).

	CL. 2	CL. 3	CL. 4
CL. 1	ns	p=0.01	p=0.02
CL. 2		p=0.02	p=0.03
CL. 3			p<0.01

3.3.3. Ratio and distribution of the ponds in both areas

The ratio of ponds belonging to each cluster in area A and B differs in some respect (Tab. 11). Type 3 ponds (characterised by a rich vegetation and in area A by the highest numbers of frogs), which were most important for reproduction, were rare in area B. Type 1 (sunny-bare) was more common in area B. This indicates that the mean habitat quality is lower in area B than in area A.

3.4. Change of landscape, decreasing number of ponds and frogs

In both areas there has been an intensification of agriculture during the last 40 years. Comparing topographic maps from 1950 to 1960 with the actual situation revealed a loss in area A of 27 % of the ponds existing 40 years ago and in area B of 56 % of the ponds. The loss was extremely high (75 %) in the northern quarter of area B.

Farmers living in the northern part of area B, where no *R.e.* and *R.l.* were found during the study period, reported that concerts of frogs were common 10 to 20 years ago. Presumably these frogs were *R.e.* and *R.l.*: In 1981 I found these species in a pond in the northern half of the area were they are now extinct. The only other possible (calling) species, *Hyla arborea*, was not found in area B. It is likely that area B became less suitable for *R.e.* and *R.l.* with the decreasing number of ponds, and that the number of stocks has been declining over the last years, and may continue to do so.

4. Discussion

4.1. Area A (high pond density)

Shade, depth and vegetation seem to determine the size of the stocks in area A. These findings coincide with descriptions made by Blab (1986) and Dorn & Brandl (1991) of the preferred habitat type of *R.e.* and *R.l.* Frogs depend on vegetation for cover and range of actions and male choruses in particular are formed in areas of webbed leaf vegetation during the mating season. The sun factor may have a direct influence – the animals prefer to sit on sunny parts of the shore (Dorn & Brandl 1991) – as well as an indirect one: sunny ponds generally have richer vegetation (a significant negative correlation between shade and vegetation was found) and a higher water temperature than shaded ponds. The preference of high water temperatures was shown in the case of adult *R.l.* (Sjögren et al. 1988).

The reason for the correlation of stock size and depth may be the fact that shallow ponds are often periodic ones and few frogs stay there when they are filled with water. Deeper ponds in the area (maximum 100 cm) also have less reed and a higher ratio of the preferred webbed leaf- and submerged vegetation.

Tab. 8. Description of the stocks of different clusters in area A.

pond type (cluster)	stock size	reproductive success
1: sunny – bare	between long and high	no or little (REPR -/+)
2: sunny – vertical vegetation	permanent stock size between medium and high periodic: no frogs, or low stock size	permanent: no, little or high reproduction (REPR -/+/++) periodic: no reproduction (REPR -)
3: sunny – horizontal vegetation	stock size between high and very high	no, little or high reproduction (REPR -/+/++)
4: shaded – bare	periodic: no frogs or very low stock size permanent: stock size between low and medium	no reproduction (REPR -) no reproduction (REPR -)

The high stock sizes in ponds with fish, that were also found by Dorn & Brandl (1991) may be caused for the following reasons: Ponds with fish are significantly deeper and have a significantly larger proportion of sunny shoreline then ponds without fish, and as already mentioned, depth and sun are correlated positively with stock size (Tab. 3). Fish were not observed to have a negative influence on stock size as mentioned by Hemann & Zucci (1985), but a negative influence on reproductive success is likely (see below). However, area A did not feature fishponds with large fish populations.

The most important factors for reproduction seem to be sun and vegetation. Sun is important in causing a high water temperature, which in turn accelerates the development of tadpoles (Eikhorst 1984).

Dense vegetation is supposed to be necessary as a cover for the spawn and the tadpoles, which might be more vulnerable in open water: In several ponds without vegetation spawn was found, but in these cases successful reproduction (REPR (+) or (++)) was not observed if fish, which are supposed to be a main predator of the tadpoles, lived in the pond. Additionally the low reproduction rate in ponds with sparse vegetation (type 1) may be also due to the low number of offspring resulting from *R.e.*-*R.e.* matings, which are very likely in such ponds where the percentage of *R.e.* is very high.

Tab. 9. Stock sizes of different pond types (clusters) in area B.

pond type (Cluster)	adult frogs mean	std. div.	min.	max.	N	mean N.AD
1	4,9	7,2	0	25.0	14	15,7
2 perman.	1,0	2,8	0	8,0	8	5,0
2 period	1,6	1,9	0	5,0	8	17,1
3	0,4	0,7	0	1,5	4	0,4
4 perman	3.5	4.5	0	10.5	6	11,0
4 period.	0	0	0	0	2	4.7

Tab. 10. Ratio of *R.e.* in ponds of different types (clusters) in area A.

type	mean % R.e. of the ponds	std. error	N (ponds)	caught frogs total	caught frogs %R.e.
1:sunny - bare	85.2	17.7	6	87	83
2:sunny - vertical vegetation	42.0	31.4	8	112	36
3:sunny - horizontal vegetation	58.1	17.9	9	133	59
4:shaded - bare	61.6	33.9	7	50	64

Tab. 11. Ratio of ponds of different types in both areaa (2a, 4a: permanent groups; 2b, 4b: periodic groups). The total number of ponds was 36 in area A and 42 in B.

Type	1 sunny - bare	2a sunny - vertical veg.	2b	3 sunny -horizontal veg.	4a shaded - bare	4b
% in A	22	17	8	28	17	8
% in B	33	19	19	10	14	5

There was no reproductive success in the majority of the ponds inhabited by frogs, meaning that a low number of the habitats, mainly the ponds with high reproductive success (REPR ++), have to support all the other stocks in the area. The number and distribution of such ponds in area A allows a sufficient production of juveniles to populate every pond according to its capacity (habitat quality), meaning that "empty places" e.g. in ponds where reproduction does not take place are quickly filled by immigrating young frogs. The distances between the ponds in area A are short and the exchange of animals is presumably high, meaning that the frogs in this area share a common gene pool. This is suggested by the fluctuating numbers of subadults and the observed migrations of adults and subadults between the ponds of area A (Zahn 1996).

4.2. Area B (low pond density)

The main factor limiting the number of frogs in area B ponds is the "supply of frogs" from the neighbouring ponds and not the quality of the ponds themselves. More frogs could live in most of the ponds than is actually the case. There was no reproduction in most of the ponds and therefore the stock size mainly depended on immigration. It can be presumed that suboptimal habitat structure (little vegetation) and the high percentage of *R.e.* (low reproductive success of *R.e.* × *R.e.* matings) prevent successful reproduction in many cases. In ponds with only few adults it is uncertain whether they are inhabited by sexually active frogs of both sexes during the mating season and thus in the case of many ponds it may be purely chance which decides whether reproduction occurs; equally the number of ponds in area B where reproduction occurs might differ from year to year.

The combination of great distances between the ponds and low habitat quality limits the distribution of the frog population: The number of offspring produced in the few ponds suitable for reproduction, is not sufficient to populate the isolated ponds in most parts of the area.

The intensive agriculture of area B may intensify the "isolation" effect, devaluating some of the ponds (for example, because of the diffusion of chemicals) and thus causing a lower density of suitable waters. Additionally migration between ponds is more difficult in fields with low cover and a dry micro climate than it is in meadows and forests (Müller & Steinwarz 1987, Blab et al. 1991).

4.2.1. Why were no frogs observed in ponds of high habitat quality.

The frog population in area B probably declined over the last 20 years (see section 5). It is not clear why there are no small stocks left in the few ponds of the northern half of high habitat quality (types with rich vegetation (2 and 3; potentially suitable for reproduction). The time of population decline seems to be short for an extinction due to risks of a low population density. Sjögren (1991), for example, could not find any signs of inbreeding depression in isolated populations of *R.l.* A possible explanation for this phenomenon is that changes in pond quality may happen quickly. Most of the ponds in area B were artificial created to raise fish and ducks or as watering places. Depending on the owner's interests times of intensive use of a pond may alternate with those of undisturbed succession. This may cause that the vegetation, a factor of main importance for frog reproduction, may alter totally within a few years. Therefore, it is likely that throughout years varying ponds were suitable for high reproduction for longer or shorter periods. In areas with a high density of ponds the frog population is able to exist if the percentage of ponds suitable for reproduction is not too low, irrespective of alterations within the single ponds (situation in area A). Similar models are discussed by Ebenhard (1991), Olivieri et al. (1990), Hanski (1989, 1991), Hanski & Gilpin (1991) and for a northern population of *R. l.* by Sjögren (1994). However, if many ponds are destroyed, a local decrease of habitat quality can no longer be compensated for by better conditions in the neighbourhood and if local extinction occurs, new immigration is no longer possible.

Assuming that this explanation is correct, ponds which are not populated by frogs but which seemed suitable might have been suboptimal some years ago. Immigration is now unlikely due to the distances of existing stocks.

4.2.2. Ratio of *R.e.* and *R.l.* in area B

A higher percentage of *R.e.* was found in ponds of area B than in ponds of area A. Possible explanations for this difference are the habiat types and the distances between the ponds:

Type 1 ponds (sunny-bare), which showed the highest percentage of *R.e.* in area A (Tab. 10), are more common in area B than in area A. Additionally, *R.l.* seems to be less able to migrate than *R.e.* (Heym 1974). Therefore it can be assumed that the *R.e.* ratio of a stock will increase with the isolation of the pond, if frogs do not reproduce in the pond itself and the habitat is populated by immigrants (as most ponds of B).

4.3. Ratio of *R.e.* and *R.l.* in adults and juveniles

In every case the *R.e.*-ratio of juveniles was higher than the *R.e.*- ratio of adults (Fig. 3). It can be assumed that mechanisms exist to compensate for the higher number of metamorphosing *R.e.*, otherwise a strong sudden shift in the *R.e.*-*R.l.* ratio will occur within a few generations. Obviously this does not happen in areas as A where the ratio of *R.l.* is high. A possible compensating factor is the difference in habitat preference of *R.e.* and *R.l.* (see section 3.3.2.). Most *R.e.* settle in ponds with sparse vegetation where reproduction is low, while *R.l.* prefers ponds with rich vegetation. In ponds with rich vegetation that are suitable for high reproduction, the percentage of *R.e.* therefore may not rise, if lots of young *R.e.* emigrate to other types of ponds.

It would seem that this compensation does not work in area B as the percentage of *R.l* was also low in the (few) ponds with reproduction belonging to types preferred by *R.l.* Probably the percentage of *R.e.* is still rising in area B: In only one pond considerable reproduction did occur and in this case the ratio of *R.e.* was 11 % amongst the adults. About 50 juveniles metamorphosed of which 20 were caught and all were *R.e.* There seems to be no possibility to compensate for this high percentage of *R.e.* Eventually the fact that *R.e.* females prefer *R.l.* males over their own (Apt & Reyer 1993) accelerates the change of species composition.

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32. Ross, R. A. & G. Marzec: The Reproductive Husbandry of Pythons and Boas. - Institute for Herpetological Research, Stanford, 1990. 270 S., zahlreiche Farbabb. und Fortpflanzungsdiagramme.

Ein umfassendes Werk zur Fortpflanzungsbiologie der Riesenschlangen, insbesondere ausgerichtet auf die Pflege dieser Schlangengruppe im Terrarium. Das Buch ist in 2 Sektionen unterteilt und beginnt in Sektion 1 mit einem Index der wissenschaftlichen und populären Namen für Pythons und Boas. Dann folgt ein allgemeiner, einführender Abschnitt zur Pflege und Zucht der Schlangen in menschlicher Obhut. Er ist sehr detailliert gestaltet und enthält u.a. Themen wie Geschlechtsbestimmung, Fortpflanzungsstrategien, Wetter und Paarung, Kannibalismus, Fortpflanzungskapazität und Alter, Angaben zu Größe und Ausstattung der Terrarien, Ei-Anatomie, Fruchtbarkeitsdiagnose, Spermienaufbewahrung, Hemipenis, künstliche Befruchtung oder Schwangerschafts-Diagnose. In einem eigenen Kapitel kommen Anomalien und Krankheiten bei trächtigen Schlangen zur Sprache. Das Ei, seine Inkubation und der Schlupf der Jungschlangen werden ebenfalls in einem gesonderten Kapitel behandelt. Schließlich werden die nachgeburtliche Entwicklung der Jungen, die künstliche Ernährung - vor allem von Weibchen nach der Eiablage - und die Genetik der Boiden-Fortpflanzung besprochen. Die Sektion 2 des Buches enthält dann Fortpflanzungsdaten für die einzelnen Arten, wiederum getrennt nach Pythons und Boas. Jeder Art ist ein Diagramm der Fortpflanzungszeit im Jahr beigefügt. Eine Fülle von Farbfotos stellt die jeweiligen Schlangenarten vor und verdeutlicht die Informationen des Textes. Den Schluß des Bandes bilden ein Kapitel zur Bedrohung der Reptilien in unserer Zeit, ein Literaturverzeichnis, ein Glossar und ein Index. Für Pfleger und Züchter von Riesenschlangen, wie auch für den Fachwissenschaftler, enthält dieses Werk unerläßliche und wertvolle Informationen. U. Gruber

33. Gow, G. F.: Complete Guide to Australian Snakes. - Angus & Robertson Oubl., North Ryde-Auckland-London, 1989. 171 S., zahlreiche Farbabb., Zeichnungen und Verbreitungskarten.

Dies ist zwar kein Feldführer, aber mit seinen vielen Farbbildern und Verbreitungskarten eine brauchbare Informationssammlung zur Vielfalt der Schlangenfauna in Australien. Das Buch beginnt mit den üblichen Einführungsabschnitten über generelle Charakteristik (Gesicht, Gehör, Geruch, morphologische Merkmale, Anatomie, Nahrung, Fortpflanzung, Alter). Dann folgen Kapitel über Fang, Transport und Konservierung von Schlangen, die Pflege in Menschenobhut, Geschlechtsbestimmung, Zucht und Krankheiten. Ausführlich wird auf Gift und Giftbisse eingegangen, wobei Verhaltenshinweise und Informationen über Antiseren und ihre Verabreichungsmenge besonders nützlich sind. Den Hauptteil des Werkes nimmt allerdings die Präsentation der Arten ein. Jede Art wird mit Text, Farbbild und Verbreitungskarte beschrieben. Der in Stichworte gesetzte Text umfaßt den Populärnamen, den wissenschaftlichen Namen, die Identifikation, biologische Bemerkungen, ähnliche Arten und das Vorkommen. Bestimmungsschlüssel für Gattungen und Arten führen jeweils in die entsprechende Familie oder Gattung ein. Das Buch ist sehr übersichtlich geordnet, so daß man sich ohne Schwierigkeiten zurechtfindet. Es kann sowohl dem Terrarianer als auch dem wissenschaftlich arbeitenden Schlangenfachmann empfohlen werden. U. Gruber

34. Jarofke, D. & J. Lange: Reptilien, Krankheiten und Haltung. - Tierärztliche Heimtierpraxis Bd. 3, Verl. Paul Parey, Berlin u. Hamburg, 1993. 188 S., 40 s/w Abb., 28 Tab., 4 Farbtaf.

In diesem Paperback wird dem Leser ein außerordentlich umfangreicher Stoff knapp gefaßt und übersichtlich angeordnet nahegebracht. In 4 Großkapiteln (Krokodile, Schildkröten, Echsen, Schlangen) wird eine unglaubliche Fülle an Informationen zur Pflege, Krankheitserkennung und Krankheitsbehandlung verarbeitet. Dabei reichen die übergeordneten Themen in jedem dieser Kapitel von Haltung und Fütterung, Geschlechtsbestimmung, Fortpflanzung und Aufzucht über Haltungsschäden und ihre Behandlung, physiologische Daten und Untersuchungsmethoden bis zu Infektionskrankheiten, Organkrankheiten, Intoxikationen, Tumoren und Mißbildungen, Behandlungsmethoden und chirurgischen Eingriffen. Auch das Töten der Tiere unter Berücksichtigung der gesetzlichen Bestimmungen kommt zur Sprache. Jedem Großkapitel ist ein eigenes Literaturverzeichnis beigegeben. Im Anhang finden sich, neben einem allgemeinen Reptilen-Literaturverzeichnis, Listen der wichtigsten herpetologischen Zeitschriften, der Hersteller von Schlangengift-Antiseren, der in diesem Buch wiederholt genannten Medikamente sowie Anschriften einiger Terrarienhäuser. Schließlich gibt es eine Dosierungstabelle und ein Sachregister. Die zahlreichen Abbildungen und Tabellen sind sehr informativ. Das Werk dürfte für jeden Terrarianer und für jeden Zoo-Herpetologen eine wahre Fundgrube sein. U. Gruber

35. Köhler, G.: Basilisken; Freilandbeobachtungen, Pflege und Zucht. - Verlag Gunther Köhler, Hanau, 1993. 107 S., 28 Farb- und 24 Schwarzweißfotos, 32 Zeichnungen und Diagramme.

In diesem Büchlein werden - sachkundig und engagiert - die echten Basilisken mit ihren 4 Arten (*Basiliscus basiliscus, B. galeritus, B. plumifrons, B. vittatus*) vorgestellt. Nach einführenden Worten über Name, Systematik, Verbreitung, Lebensraum und natürliche Feinde wird die Pflege im Terrarium und die Zucht von Basilisken behandelt. Dann folgen ein Bestimmungsschlüssel und die einzelnen Arten in eigenen Kapiteln. Diese sind wiederum unter den Stichworten: Namen, Synonymieliste, Beschreibung, Verbreitung, Lebensraum und Lebensweise, Ernährungsgewohnheiten, Fortpflanzung und Zucht übersichtlich geordnet. Die große Fülle der Abbildungen liefert wertvolle Zusatzinformationen. Die Begeisterung des Autors über seine Lieblingstiere teilt sich dem Leser im interessant und fesselnd geschriebenen Text mit. Schließlich runden ein Literaturverzeichnis, Erklärungen von Fachausdrücken, Herstellernamen im Text erwähnter Produkte und ein Register das lesenswerte Bändchen ab, an dem jeder Echsenfreund seine Freude haben dürfte. U. Gruber

36. Welch, K. R. G.: Snakes of the Orient, a checklist. - R. E. Krieger Publ. Comp., Malabar, Florida, 1988. 183 S.

Für den Systematiker und Taxonomen ist es immer erfreulich, wenn er sich anhand von Checklisten bestimmter geographischer Gebiete einen Überblick über die ihn interessierende Tiergruppe verschaffen kann. Insofern ist die vorliegende Liste der Schlangen aus dem südlichen und östlichen Asien sehr zu begrüßen. Sie ist nach Familien geordnet, enthält aber pro Art mit Namen, Typus-Lokalität und Verbreitung nur äußerst knappe Informationen. Die Namensgebung entspricht im wesentlichen der aktuellen Nomenklatur, obgleich man fragen kann, ob Gattungsnamen wie beispielsweise *Disteira* wirklich notwendig sind; andererseits vermißt man den Gattungsnamen *Daboia* völlig. Der Museumsherpetologe wie auch der taxonomisch arbeitende Schlangenfachmann wird seinen Nutzen aus diesem Werk ziehen. U. Gruber

37. Williams, K. L. & V. Wallach: Snakes of the World, Vol. I, Synopsis of Snake Generic Names. - Krieger Publ. Comp., Malabar, Florida, 1989. 234 S.

Mit Freude begrüßt man diese fleißige Zusammenstellung sowohl aller gängigen, als auch der überholten Gattungsnamen der Schlangen. Das Zurechtfinden wird noch dadurch erleichtert, daß die aktuellen Gattungsnamen mit Großbuchstaben hervorgehoben sind. Die Anordnung der Namen folgt ausschließlich dem Alphabet und ist nicht noch einmal unterteilt. Das Literaturverzeichnis ist außerordentlich umfangreich und enthält alle Erstautoren der Gattungsbeschreibungen. Ein nützliches Buch insbesondere für Sammlungsherpetologen.

U. Gruber

38. Cei, J. M.: Reptiles del noroeste, nordeste y este de la Argentina. - Museo Regionale Monografie XIV, Museo Regionale di Scienze Naturali, Torino, 1993. 949 S., 112 Abb., 37 Karten, 126 Farbtaf. ISBN 88-86041-06-3.

Ein mächtiges, fast 1000 Seiten starkes Werk, das die Reptilienfauna einer umgrenzten südamerikanischen Region ausführlich monographisch behandelt. Nach einer kurzen Einführung mit historischen, biogeographischen, anatomischen (z.B. Hemipenisstrukturen bei Schlangen) und genetischen Hinweisen beginnt bereits auf Seite 51 der systematische Hauptteil des Buches. Auf eine allgemeine Klassifikation der vorkommenden Reptilien folgen ausführliche Bestimmungsschlüssel, zuerst in spanischer, dann in englischer Sprache. Sie reichen von der Familie über die Gattung bis zur Art herunter. Die Beschreibungen der einzelnen Arten sind wiederum nach einem gängigen Schema unterteilt: Artname, Synonynmieliste, Diagnose, Beschreibung, Verbreitung, biologische Bemerkungen. Jeder Familie und Gattung wird ein Einführungsabschnitt vorangestellt. Anatomische Schwarzweißzeichnungen, Diagramme, Verbreitungskarten und Farbtafeln liefern zusätzliche Informationen. Besonders ausführlich werden die Iguaniden-Gattungen *Liolaemus* und *Tropidurus* sowie die Grubenotterngattung *Bothrops* behandelt. Die Farbtafelserie am Ende erfreut durch die gute Qualität ihrer Fotos. Das umfassende Literaturverzeichnis und ein Register runden den wertvollen monographischen Band ab, dessen einziger Nachteil darin besteht, daß er in spanischer Sprache abgefaßt wurde. U. Gruber

39. Mayer, R. Europäische Landschildkröten, Leben-Haltung-Zucht. - AVA-Agrar Verlag Allgäu, Kempten, 1992. 127 S., 116 Farbabb., 2 Karten, zahlreiche Schwarzweißabb.

Hier werden, verständlich und übersichtlich, die 4 europäischen Landschildkröten-Arten vorgestellt (*Testudo hermanni, T. graeca, T. marginata, Agrionemys horsfieldi*). Nach kurzen Kapiteln zur Abstammung und zum Körperbau werden die Arten und Unterarten anhand der wichtigsten Erkennungsmerkmale beschrieben. Danach folgen Abschnitte, die vor allem für den Terrarianer interessant sind: Geschlechtsunterschiede, Paarung, Eiablage, Inkubation, Aufzucht der jungen Schildkröten, Ernährung, Sinnesorgane und "Intelligenz", das wechselwarme Lebewesen, Überwinterung. Vier weitere Kapitel beschäftigen sich etwas ausführlicher mit den einzelnen Arten und vervollständigen das jeweilige Lebensbild. Nach der Schilderung der Schildkrötenfauna Sardiniens gibt es dann noch einmal allgemein interessante Beiträge mit den Themen Freilandterrarium, Verbreitung der Landschildkröten in Europa, Nordafrika und Asien, Artenschutz und Tierschutz sowie ein Merkblatt für die Aufzucht, ein Literaturverzeichnis und eine Liste von für den Schildkrötenliebhaber wichtigen Fachzeitschriften. Jeder, der sich der Pflege und Zucht der Europäischen Landschildkröten verschreibt, kann Nutzen aus diesem Buch ziehen, dessen Autor aus reicher eigener Terrarienerfahrung schöpft.

U. Gruber

40. Günzel, W. R.: Wasser Lebenselement - Feuchtbiotope unserer Heimat.- Birgit Schmettkamp Verlag, Bornheim, 1993. 142 S.

Die Faszination des Wassers in der Landschaft hat den Autor gefangengenommen und ihn veranlaßt, einige Bedingugen und Zusammenhänge der Pflanzen und Tiere exemplarisch herauszugreifen. So sind vier Kapitel entstanden, die sich mit den Bewohnern der Feuchtwiesen unter besonderer Berücksichtigung des Weißstorches, den Teichen und Seen, auf denen der Höckerschwan dominiert, den Bächen und Flüssen, an denen die Libellen besonders auffallen, und den Mooren, Heimat fleischfressender Pflanzen, befassen. Verständlicherweise mußten einige wichtige Wasserbewohner auch unter den Amphibien und Säugetieren unberücksichtigt bleiben. Neben den augenfälligen Erscheinungsformen dieser Habitate werden auch Abhängigkeiten von anderen Organismen aufgezeigt. Was das Buch, besser diesen Bildband, neben den gezielten Aussagen jedoch zu einem Kleinod macht, sind die hervorragenden Fotos, von denen jedes für sich in seiner Aussagekraft auf den Betrachter wirkt. Nach der Betrachtung dieser Bilder ist sicher der Blick für die Vorgänge an unseren heimischen Gewässern geschärft und durch neue Blickwinkel lassen sich bisher vernachlässigte 'Objekte' vor einem neuen beeindruckenden Hintergrund sehen. Der Zauber der Schönheit der hier abgebildeten Tiere und Pflanzen auch im Zusammenspiel erfaßt sicher jeden Leser, nicht nur den Naturfreund. Nicht überdeckt werden kann die Wehmut, daß in der Zukunft wie schon in der Gegenwart die Möglichkeiten immer geringer werden, derartige Schönheit vor Ort zu beobachten, da die Lebensräume der behandelten Organismen immer kleiner und weniger werden. Das Schlußwort des Autors nährt diese Wehmut und läßt auch Wut über die Eingriffe des Menschen in das Lebensgefüge an und in unseren Gewässern aufkommen.

E.-G. Burmeister

41. Bin-Cheng Zhang: Index of Economically Important Lepidoptera. - University Press, Cambridge, 1994. 599 S., unbebildert.

Das vorliegende Buch präsentiert einen Überblick über ca. 6000 Schmetterlingsarten, die bisher weltweit als wirtschaftlich bedeutsame Schädlinge bekannt geworden sind. Im Anschluß an eine vorangestellte Tabelle der Schmetterlings-Familien mit ihren zugehörigen Genera erfolgt im Hauptteil des Buches die Besprechung der einzelnen Schädlingsarten. Hierbei werden neben dem jeweiligen lateinischen Artnamen auch die wichtigsten Synonyme (insgesamt ca. 6.000) sowie englische "common names" erwähnt. Es folgen "host records" und "geographical records", wobei der Autor unter letzteren - etwas irreführenderweise - keineswegs ein Gesamtverbreitungsgebiet versteht, sondern nur die Nachweise aus den Ländern, in denen die Art bereits als wirtschaftlich bedeutsam gemeldet wurde. Den Abschluß der Artbesprechung bilden die "RAE references", Verweise auf einschlägige Artikel im "Review of Applied Entomology". Da in diesem Hauptteil die Artabfolge in alphabetischer Reihenfolge der wissenschaftlichen Artnamen (Binomina) angeordnet ist, führt der Autor viele Arten an mehreren verschiedenen Stellen unter den am häufigsten gebräuchlichen Gattungssynonymen auf. Der Artenindex am Ende des Buches erleichtert zusätzlich das schnelle Auffinden gesuchter Taxa.

Nach eigenen Angaben (S. 1) wurde das Buch "unter Zeitdruck und mit begrenzten Mitteln verfaßt, es ist daher nur als erster Schritt zu verstehen." Dies grenzt ein wenig an Tiefstapelei, bedenkt man, daß im Vorfeld der Publikation des vorliegenden Kataloges das Fachwissen einer Vielzahl namhafter Entomologen mit einfloß (v.a. der Kollegen des Natural History Museums, London), wodurch z.B. im Hinblick auf Nomenklatur ein hoher Grad an Modernität garantiert wird. So ist aus der Übersicht ein wichtiges Nachschlagewerk sowohl für die angewandte als auch für die allgemeine Entomologie geworden, das den relativ geringen Preis sicherlich rechtfertigt.

A. Hausmann

42. Roesler, R.-U.: Phycitinae, Quadrifine Acrobasiina (erster Teil). - In: Amsel, H. G., Gregor, F., Reisser, H. & R.-U. Roesler (Hrsg.): Microlepidoptera palaearctica, 8. Band. - Verlag G. Braun, Karlsruhe, 1993. Textband 305 S., 91 Abb.; Tafelband: 10 Farbtafeln mit 125 abgebildeten Faltern, 68 Schwarzweißtafeln, 4 Verbreitungstabellen, Leinen.

In bewährter Weise wird die Buchreihe der "Microlepidoptera palaearctica" mit einem Doppelband (Text+Tafeln) über eine Teilgruppe der Pyralidae/Phycitinae fortgesetzt. Der behandelte Sektor aus der genannten Unterfamilie umfaßt 103 Arten, wobei durch eingehendes Typenstudium eine Vielzahl von weiteren Taxa als synonym erkannt wurde.

Hervorstechendste Eigenschaft der Neupublikation ist wie in den anderen Bänden das drucktechnisch äußerst aufwendig und luxuriös gestaltete Outfit. Dies führt leider zu einem außerordentlich hohen Preis, bei dem oft auch die eingefleischtesten Microlepidopteren-Liebhaber genau nachrechnen müssen, ob sie sich diese Investition leisten können. Schade, denn das dargelegte Wissen und die Art der Darstellung ist in dem behandelten Teilbereich unübertroffen und stellt alles bisher Publizierte weit in den Schatten. A. Hausmann

43. Glaßl, H.: *P. apollo*, seine Unterarten. - Eigenverlag, Druck R. Heßler, Baiersdorf, 1993. 214 S., 47 Farbfotos, 10 farbige Verbreitungskarten. Keine ISBN-Nr. angegeben.

Der Apollofalter fasziniert schon seit je her nicht nur Schmetterlingsliebhaber, sondern wohl jeden Zeitgenossen, der sich in irgendeiner Weise für Natur interessiert. Eine Unmenge von Abbildungen auf Gemälden, Kunstobjekten, Briefmarken u.s.w., weisen darauf ebenso hin wie auch der Umstand, daß der Name des Apollofalters Pate für eine ganze Reihe von Vereinen und Verlagen stand. Dieser Beliebtheitsgrad und die außerordentliche geographische Variabilität (als Folge der seßhaften Strategie dieses Schmetterlings) führten dazu, daß sich auch viele taxonomische Arbeiten mit "*Parnassius apollo*" befaßten. So viele, daß H. Glaßl in seiner Monographie 278 (!) benannte Unterarten und 192 (!) benannte Aberrationen aufführen kann. Es werden z.B. allein aus dem nordwestlichen Teil der Karpathen 16 Taxa auf Unterart-Niveau erwähnt. Nach der Lektüre des vorliegenden Werkes bleibt als Haupteindruck die tiefste Überzeugung, daß hier einmal kräftiges "Ausmisten" gefragt ist! Für einen solchen reduktiv-taxonomischen Schritt ist die vorgelegte Übersicht eine willkommene Grundlage. Lobenswert ist - so gesehen - die Haltung des Autors, keine taxonomischen Bewertungen der aufgeführten Taxa abgeben zu wollen.

Der positive Gesamteindruck des Buches wird durch den unglücklich gewählten Titel geschmälert: Störend hierbei nicht nur die Abkürzung an sich, sondern auch die Zweideutigkeit des Kürzels "P." im Französischen. Auch in bezug auf sprachlichen Ausdruck, Grammatik und Interpunktion hätte dem Werk ein strafferes Lektorat sicherlich gut getan. Schon im ersten Satz des Vorwortes ergibt sich ein völlig falscher Sinn-Zusammenhang.

Positiv fällt die Vielzahl exzellenter Freilandfotos (Falter, Habitate) auf; in einigen wenigen Fällen scheinen die extrem weit nach vorne gezogenen Vorderflügel auf Betäubungen hinzudeuten. Das Werk wird von einem nach Zeitschriften geordneten "Literaturverzeichnis" und von einem alphabetisch nach Autoren sortierten "Quellenverzeichnis" abgeschlossen. A. Hausmann

44. Kinzelbach, R. (ed.): Biologie der Donau.- Limnologie aktuell Vol. 2.- Gustav Fischer Stuttgart, Jena, New York, 1994. 370 S., 96 Abb., 51 Tab..

Nach dem zusammenfassenden Werk von R. Liepold (ed.) zur 'Limnologie der Donau' aus dem Jahr 1967 ist der vorliegende Band ein Ausdruck der umfangreichen Veränderungen seither, aber auch der derzeitigen Forschungsschwerpunkte. Die zahlreichen Autoren der Anrainerstaaten zeigen das gemeinsame Interesse an der Erforschung dieses zweitlängsten Fluses Europas. Die 22 Einzeldokumentationen sind in die Themenkomplexe 'Anorganische Grundlagen und Plankton', 'Zoobenthon', 'Nekton' und 'Wassergüte und Ökosysteme' gegliedert. Die Bauvorhaben und bisher durchgeführten einschneidenden Maßnahmen an dieser bedeutenden Wasserstraße haben die letzten Ressourcen einer naturnahen Flußlandschaft in den Mittelpunkt des Interesses gerückt. Die von diesem Fließwassersystem abhängigen Organismen dokumentieren die gesamte Situation und Sensibilität dieses übergeordneten Lebensraumes. Die Donau als Zugstraße östlicher pannonischer Faunenelemente nach Mitteleuropa gewinnt zusehends an Bedeutung, die Verbindung zum atlantischen Raum über den Rhein-Main-Donau-Kanal wird durch Faunenelemente bereits angezeigt. Der vorliegende Band zeigt die Lebensgemeinschaft dieses großen Stromes in funktioneller und historischer Hinsicht auf. Planungen sollten immer unter Rückgriff auf die hier vermittelten Erkenntnisse erfolgen. E.-G. Burmeister

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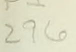
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INHALT - CONTENTS





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